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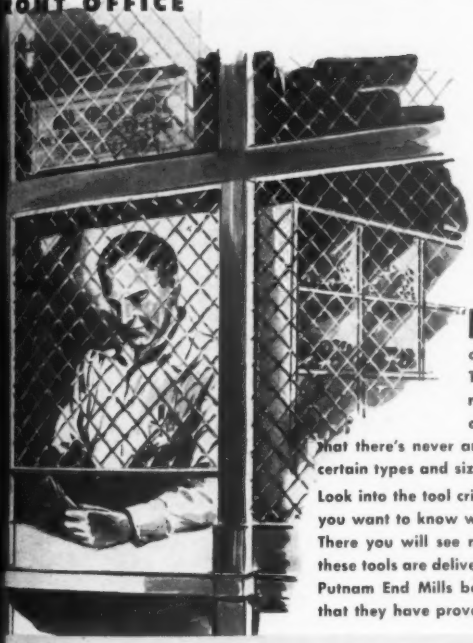
TOOL & DIE JOURNAL

TOOLING AND PRODUCTION



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"I'VE SEEN Putnam End Mills replace every other make that we've had in this tool crib. That's easy to understand because there's no doubt that they're doing a sweet job out there on the machines. I've noticed, too, that there's never any delay in delivery when we get low on certain types and sizes."

Look into the tool cribs in the top-flight plants of the country if you want to know where Putnam Hi-Speed End Mills are used. There you will see many of the familiar blue boxes in which these tools are delivered and stocked. In many cases, you'll find Putnam End Mills being used exclusively; conclusive evidence that they have proved to "cut faster and last longer".

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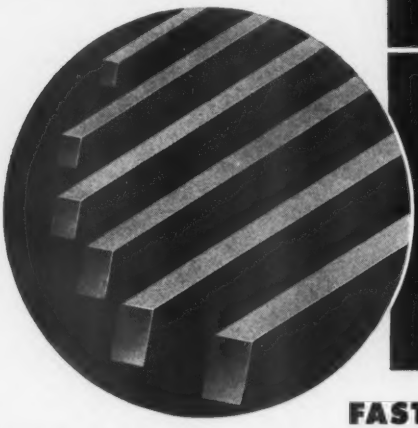

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OUR most recent development in the field of cutting materials, ALX Cast Alloy Tool Bits, is the result of complete and thorough research investigation in the Allegheny Ludlum Laboratories, and exhaustive machining tests in the field.

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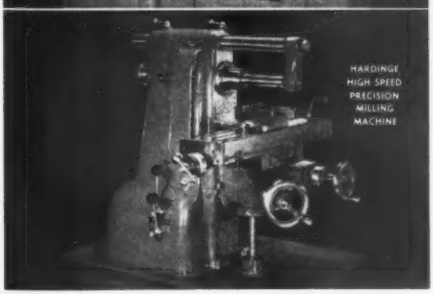

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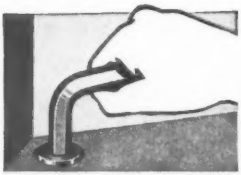

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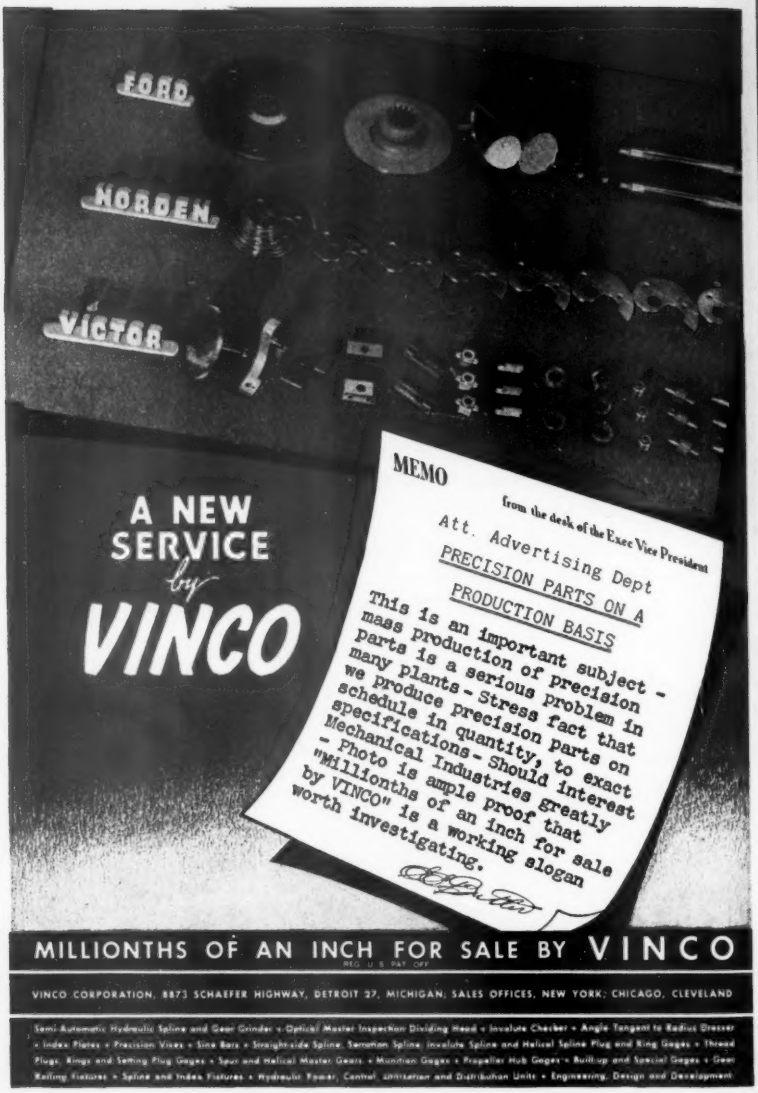
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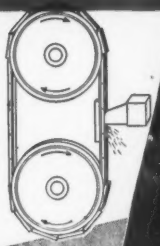

The DoALL method is a smooth, continuous, one-way operation with no loss of time, motion or energy. Today's fastest way to finish parts or products made from metals, alloys, plymetals. And, it's 4 times faster than jig filing, 9 times faster than hand filing.

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625 South California Ave., Chicago 12

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CINCINNATI Number 2 Cutter and Tool Grinder, with motor driven work head (universal equipment).

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THE CINCINNATI MILLING MACHINE CO.

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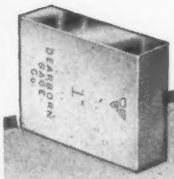

Send us your gage blocks for a complete measurement check

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Accurate calibrations are made (after the removal of high spots or burrs) in our temperature controlled inspection room, at 68 degrees Fahrenheit.

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THE "W" (OR WORKING) CHECK:

Twenty five cents for each block smaller than one inch and twenty five cents for each additional inch or fraction thereof.

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Reproduced above is a sample of a certificate of inspection, stating the specified size of each block measured and the actual measurements.

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Today's production schedules and manpower shortage make it necessary to provide workmen with every possible means of saving time and labor... and that's where Wells No. 8 Metal Cutting Band Saws fit into the picture.

They can be used as auxiliary equipment to eliminate the bottleneck at big saws. They reduce time-wasting movement of stock — instead, you move a Portable Wells to the job. Set-up and change-over time are saved by their simple operation and quick acting vise. On production cut-off jobs one man can operate 2 or more Wells saws. There is a spot in *every* metal-working plant for a Wells No. 8.

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WELLS No. 8

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ROUNDS: 8" diameter

MOTOR: ½ H.P., A.C. or D.C.

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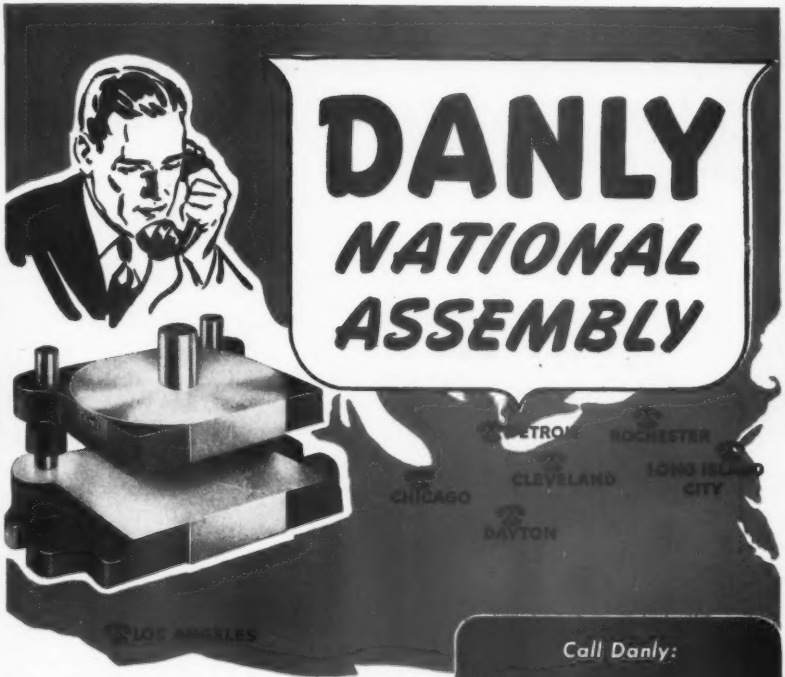

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Precision finish of every part in Danly standard die sets makes possible Danly National Assembly. The resultant perfect fit saves you time and money through faster setups and longer, trouble-free operation.

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FOR YOUR TOOL DESIGNING—

FACILITIES FOR TOOL BUILDING

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1673 ARABELLA ROAD
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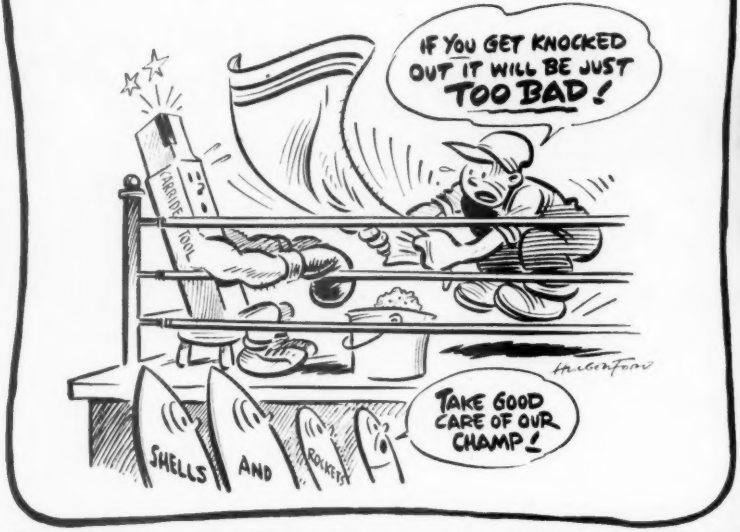

Keep Your Carbide Tools in the Fight

If you follow a few simple rules now, you can avoid a critical tool situation in your plant. Handle all your present carbide tools with "kid gloves"—treat 'em right—and they will give better service, do all that is asked of them, and enable you to meet your greatly increased production schedules.

For practical information on how best to conserve your carbide tools and save delays, get in touch with Firth-Sterling.

Firth-Sterling
STEEL COMPANY

FIRTHITE

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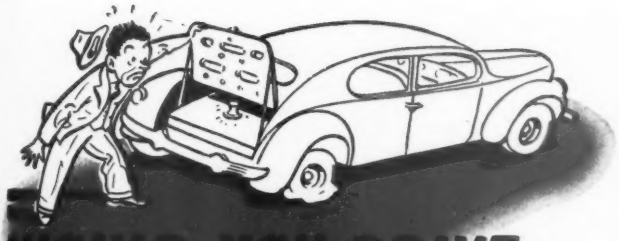
THAT CONSERVE TOOLS

1. HANDLE 'EM WITH CARE
Carelessness may damage cutting edges.

2. KEEP 'EM SHARP
Re-sharpen IN TIME! A dull edge slows production.

3. GRIND 'EM PROPERLY
Find out the right way—and DO IT.



WOULD YOU DRIVE WITHOUT A *Spare?*

"Just my luck! A flat tire and no spare! What a predicament!"

A machine shop foreman may be in a worse predicament without a spare arbor. When an arbor breaks, production ceases until the arbor is replaced. Machine and manpower hours wasted! Schedules disrupted! Deliveries delayed! That's why we say —

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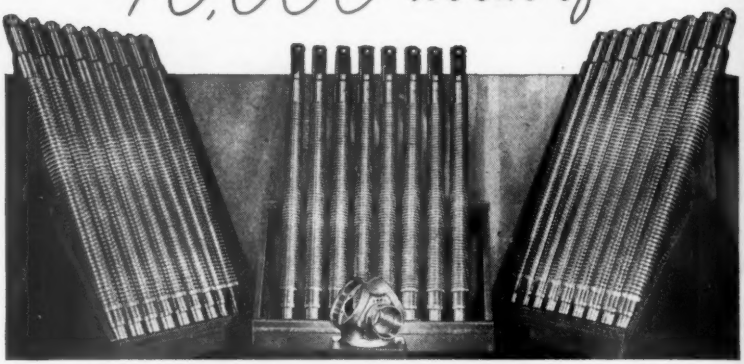

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delivered in one shipment by U. S. BROACH

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This has been particularly true of the aircraft industry where precision is the watchword.

Broaching has not only proven ideal for aircraft manufacture, but it has been the answer to many other industries' problems where precision manufacturing is required.

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U.S. BROACH Company

USB 6666 E. SEVEN MILE ROAD DETROIT 12, MICH.

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THREE ACES TO DRAW TO

If you've ever played poker (and who hasn't) how often has it been that you wished you could "draw" with a hand like this?

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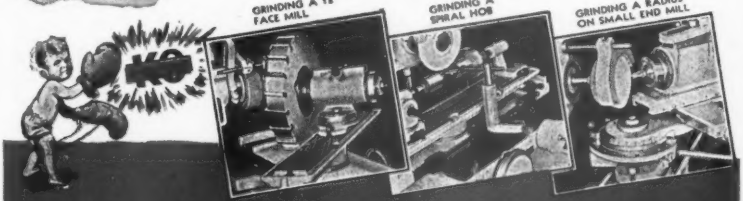
Knock-Out Universal Tool Grinders are built to accommodate most any high-speed steel cutters as well as carbide tip tools. K-O Carbide Tool Grinders are built to handle all grinding and sharpening operations necessary on single point carbide tip tools or, if desired, for grinding chip breakers only.

Thinking men are now planning for reconversion. Let us tell you how to include these "three Aces" in your plans.

See your nearest *Knock-Out* Distributor or write now for catalogue No. 36-55



If it must be Lee—it's a Knock-Out

SEE YOUR NEAREST DISTRIBUTOR OR WRITE DIRECT TO

K. O. LEE CO. ABERDEEN, SO. DAK.

Get the most from your HOBS

Call Your
DISTRIBUTOR!

Leading distributors in every section of the country have stocks of National Cutting Tools. Every National distributor offers factory trained engineers to serve you. Call your National distributor for cutting tools or any staple industrial product.

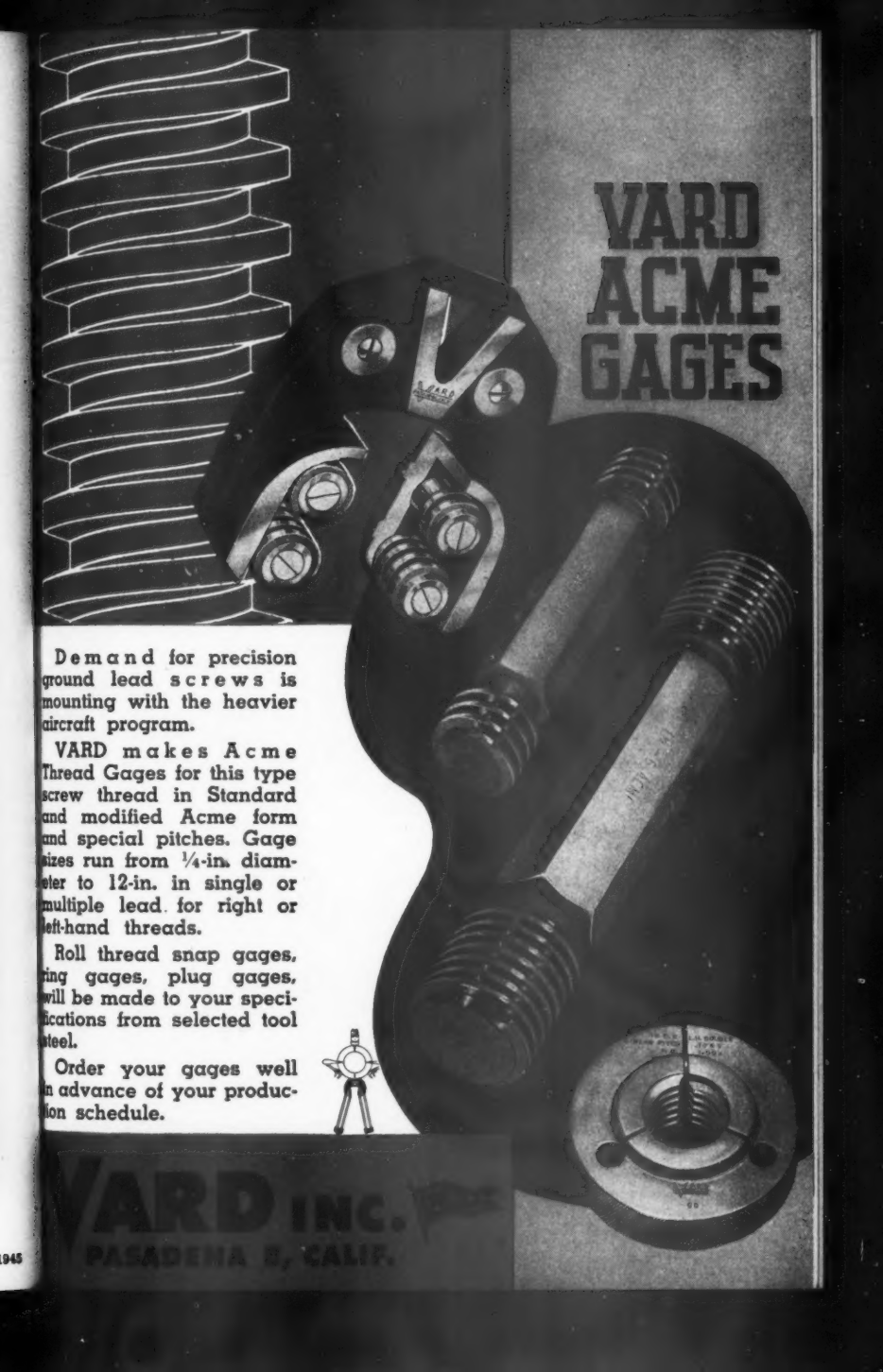
You can't be too careful when mounting a hob in the hobbing machine. Always use an indicator to make sure the hob is running true on the arbor. Better work is obtained by taking back lash and wear out of the machine's moving parts.

You can secure increased production and longer tool life if you specify National Hobs for your hobbing operations. Use the right tool for each job.

NATIONAL

TWIST DRILL AND TOOL COMPANY

DETROIT AND ROCHESTER, MICHIGAN

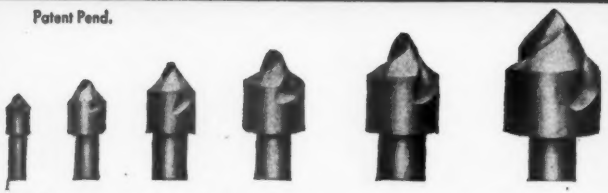

VARD
ACME
GAGES
Demand for precision ground lead screws is mounting with the heavier aircraft program.
VARD makes Acme Thread Gages for this type screw thread in Standard and modified Acme form and special pitches. Gage sizes run from ¼-in. diameter to 12-in. in single or multiple lead for right or left-hand threads.
Roll thread snap gages, ring gages, plug gages, will be made to your specifications from selected tool steel.
Order your gages well in advance of your production schedule.
VARD INC.
PASADENA 8, CALIF.

Announcing an addition to the GROBET "Complete Line"

Grobet

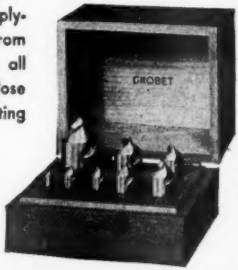
TWIN FLUTED COUNTERSINKS

Patent Pend.



Twin-fluted for precision work. They give a very smooth micro-inch finish, but are readily adaptable for coarser work. They are fast cutting. Recommended for countersinking, in aluminum, magnesium, steel, plastics, plywood, etc. Perfect chamfer is guaranteed, free from ridges or chatter-marks—accurately uniform in all cases. Made of high speed steel, ground for close tolerances after hardening, and fulfill the exacting Grobet standards of accuracy.

At present, made in 6 sizes from ¼ to 1", in 41, 45 and 30 degree angle c/i.



GROBET TWIN FLUTED COUNTERSINKS are obtainable in given sizes or offered in a strong box of polished wood containing eight countersinks to the set (two in duplicate sizes).

write for Discounts and Bulletin No. 451

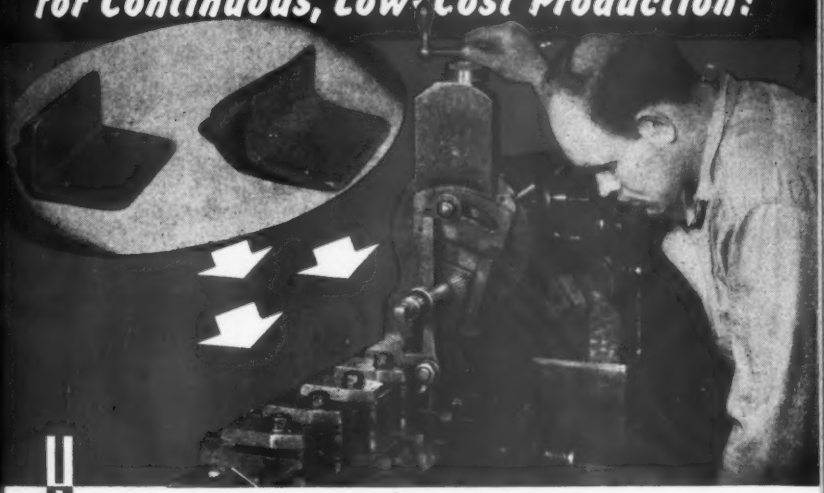
GROBET FILE CO. of AMERICA

421 Canal Street — 1812 F. L. GROBET — **New York, 13 N. Y.**

IMPORTERS OF GROBET SWISS FILES — MFRS. OF GROBET ROTARY FILES

Plants: New York • Chicago • Los Angeles

It's GEMCO Shapers
for Continuous, Low-Cost Production!



High Production on Difficult Precision Aircraft Part
Solved by Special Jig Used on

GEMCO
Multi-Purpose SHAPERS

The small inset illustration above shows an aircraft part before and after machining. It is a forging made of high-carbon alloy steel, heat treated.

To accurately and economically machine this part in quantities was a real problem. A milling machine, with its very expensive cutter, was out of the question, because of the wide variance in the hardness of the material, which might easily ruin the cutter. Secondly, the peculiar shape of the parts meant that a fixture of unique design had to be made, to hold them.

The logical method of machining proved to be the GEMCO Shaper set-up shown in the larger photo. The fixture or special jig holds the parts perfectly. And the inexpensive tool bit in the toolpost of the shaper can be readily and inexpensively exchanged and sharpened.

Thus, this GEMCO Shaper set-up successfully answers the demand for continuous, accurate production at low cost.

The many distinctive features of GEMCO Multi-Purpose Shapers can definitely help YOU produce better products—more speedily, accurately, economically. Why not investigate GEMCO's possibilities?

Write today for Bulletin GC-12D

GENERAL ENGINEERING & MFG. CO.
SAINT LOUIS 4, MISSOURI

THE *Gauge* THAT IS *Finer!*

Words or pictures cannot truly describe the inherent fineness of quality and workmanship that we have built into our height gauge.

But to actually use this rugged, beautifully built instrument is to realize why we are proud of our product. Into its design has gone the careful thought and experience which we have developed during twenty years of precision work.

Constant accuracy, handiness and its wide variety of uses make it a pleasure to work with, at the bench or in the inspection department.

*One turn of the adjusting screw moves the sliding member less than .006" for each revolution.

IT'S A 3-PURPOSE GAUGE

1 Use it as Comparator

2 Use it as Scriber

3 Use it as Height Gauge

H. E. Dickerman Mfg. Co.

321TO ALBANY STREET SPRINGFIELD, MASS.

MAKE ANGULAR SET-UPS *Faster More Accurately*

with the

MAGNA-SINE

THE MAGNA-SINE will reduce your set-up time on most types of single and compound angle operations to a matter of seconds. You simply select the proper gage blocks with the aid of the Magna-Sine Table of Constants and place them between the roll and the anvil on the Magna-Sine. The work is held firmly in place by the turn of a switch, and released with equal ease. Compare this method, which requires only a few seconds, with conventional methods often requiring an hour or more.

The Magna-Sine method is more accurate, too. The Magna-Sine itself is built to the closest limits and the use of gage blocks instead of scales or verniers makes the setting positive. There are no clamps or pressures to cause distortion or slipping. The Magna-Sine will pay for itself in a very short time in faster and better work. Every grinder or other tool room machine doing an average amount of angular work should be equipped with a Magna-Sine.

Faster Inspection, Too

The Robbins Sine Plate is a non-magnetic version of the Magna-Sine. It is built on the same principles to the same close limits but it lacks magnets. It is extremely useful for jig boring and many other light machining operations as well, as for inspection.

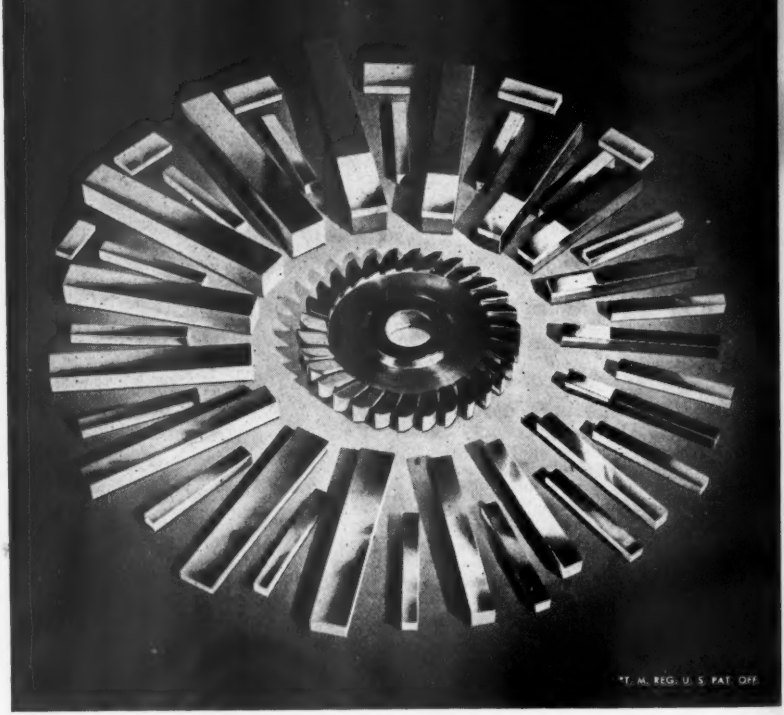
Send for Complete Specification and Price Information

Robbins ENGINEERING COMPANY

318 MIDLAND AVE. • DETROIT 8, MICHIGAN

BORCOLOY*

FAST CUTTING FERROUS TOOLS



*T. M. REG. U. S. PAT. OFF.

Announcing

THE CENTRIFUGALLY CAST BORON COBALT ALLOY

FOR "MIDDLE-RANGE" MACHINING OPERATIONS

Extensive research in the field of cutting alloys has resulted in the centrifugally cast ferrous alloy that incorporates the superior Hardness of heat treated steel (Rockwell up to C-71) with the "Red Hardness" of Cobalt, and the "Wear and Abrasion Resistance" of Boron.

Tools of BORCOLOY cut tough and heat treated materials with feeds and speeds greater than those ordinarily obtained on "bottle-neck" production jobs — particularly so on the special aircraft and ordnance materials that present such a challenge today.

In order to meet these grueling demands with maximum efficiency, may we suggest you try BORCOLOY TOOLS under your most unfavorable conditions, and let their ability speak for themselves to remove more metal faster, with finer finish, at less cost per unit.

GENERAL AIRCRAFT EQUIPMENT, INC.

Tool Division; South Norwalk, Conn.

Branch Offices: Newark Detroit Los Angeles

Canadian Sales: General Aircraft Equipment of Canada, Ltd., Montreal, P. Q.

Save production time with a

SHOPLIFTER

One man can handle heavy dies alone.

Not necessary to stop other machines to get help.

More production per day from your machines if a Shoplifter is handy to do the heavy job of moving dies from storage racks to the press. In these times when maximum production of machines is of vital importance, much time and labor can be saved if the operator can handle the heavy work of changing dies without calling for help from other operators.

The Shoplifter is built for this job. Dependable and safe with a rated capacity of 500 lbs. (heavier machines up to 5000 lbs. can be furnished). Entire machine built of structural steel. Electrically welded throughout. Steel platform 24" x 24", lifts 54" above floor and lowers to within 4⅞" of floor. Overall height 72". Crank, up and down, hoist unit.

Prompt Delivery . . . Price $147.50. Full freight allowed

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Custom

TOOL & DIE BUILDERS

SATISFYING those who are satisfied only by excellence . . . producing custom-designed tools for those whose discrimination is sharpened by the demands made upon them as Industrial Leaders in these critical days . . . Star Machine & Tool Company serves now as it has for three generations in the tool-making field.

This background of craftsmanship in designing made-to-order precision tools, which are the foundation upon which our American system of mass production is built, has helped us to fulfill demands made upon us by War Production . . . and will, soon, we trust, again be turned to the forming of the tools for Peace.

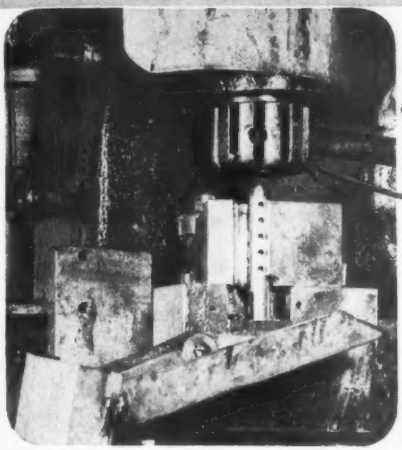
Designers and Manufacturers

OF DIES • JIGS • FIXTURES • GAGES • SPECIAL MACHINERY • JIG BORING • PLANER EQUIPMENT

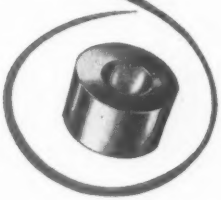
STAR ★
MACHINE & TOOL COMPANY

9320 Woodland Ave • Cleveland 4, Ohio

"HARDSTEEL"



Spinning Dies



Spin Ends Shut on Fuse Cases at the Rate of

720 Per Hour

The special properties of "HARDSTEEL"—extreme resistance to wear and heat—are used to good advantage in the high-speed production of fuse cases for artillery and anti-aircraft ammunition. Cases are made of Admiralty bronze tubing, .544" O. D. x .451" I. D. The operation is spinning one end completely shut on a .272" outside radius. This is done on a standard vertical spinning machine at 2000 R. P. M. spindle speed. Case is held by an air-operated holding fixture. No lubricant is used on die or work. Floor-to-floor time is 5 seconds per piece—2 seconds for spinning and 3 seconds for loading and unloading by hand.

The "HARDSTEEL" die averages 48 hours between grinds—regrinding taking about 3 hours. Dies can be ground 15 times before becoming too thin.

"HARDSTEEL" Drills, Tool Bits and Special Tools are solving many other production problems—among them the drilling of hardened steels and the machining of tough hard steels and abrasive non-ferrous alloys. Also inquire about "HARDSTEEL" as a metal for special parts that must meet unusual conditions of service.

LEARN TO DRILL HARDENED STEELS WITHOUT ANNEALING

The "HARDSTEEL" Operators' Manual is free. Write for your copy.

"HARDSTEEL"

DRILLS • TOOL BITS • SPECIALS

BLACK DRILL CO., Division of Black Industries, 1111 E. 152nd St., Cleveland 10, Ohio

VARD INC.
PASADENA 8, CALIF.
MAKE ACCURATE LONG WEARING GAGES
From Graph-Mo Steel
Vard Inc., have used Graph-Mo Steel for many years as material for gages that have gained an enviable record for accuracy and long service life.
Below are listed four points given by Vard Inc., as their reasons for choosing Graph-Mo Steel.
1. High production of gage blanks with minimum machine time.
2. Reduces heat treating problems.
3. Responds readily to stabilization processes.
4. Gages when finished have an exceedingly smooth surface and high polish; therefore, will give a longer wear life.
Gages are just one application where Graph-Mo, an oil hardening steel, provides outstanding performance. It is also used successfully for tools, dies, oil seals, wear plates, spindles, etc.
Graph-Mo is one of the five performance proven Timken Graphitic Steels. The others are Graph-Tung, Graph-Sil, Graph-Al and and Graph-M.N.S. Each has been designed to meet specific problems. A request written on your firm's letterhead will bring a 48 page booklet that tells *where, when* and *how* to use Timken Graphitic Steels to your greatest advantage. Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.
TIMKEN
GRAPHITIC STEELS

You can't find it *all* in books!

GRINDING has become an exact science. And so, much of the standard information users of abrasives need to specify the right abrasive for the job *can* be found in the books—notably "GRINDING FACTS" by "CARBORUNDUM." Nevertheless, industrial grinding techniques advance so fast these days, the books can't quite keep up. If you have an abrasive problem that cannot be solved by the standard pattern, call a "CARBORUNDUM" Representative. He has access to the latest information from other users and from the "CARBORUNDUM" laboratories.

And there are always the "CARBORUNDUM" Abrasive Engineers. These are the men who know abrasives and their uses from the inside out. They have helped originate many of the present-day standard grinding techniques. They can sit right down with you at the planning stage and help you work out your problems from the start, as they have done for many manufacturers. For the solution to all your abrasive problems consult your "CARBORUNDUM" Representative. He will be glad to be of service. Write to The Carborundum Company, Niagara Falls, New York.

THERE IS A PRODUCT BY

CARBORUNDUM

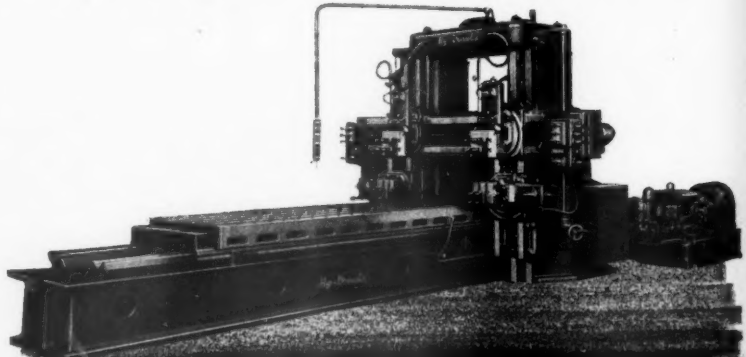
TRADE MARK

FOR EVERY ABRASIVE APPLICATION

("CARBORUNDUM" is a registered trade mark of and indicates manufacture by The Carborundum Company)

Hy-Draulic

DOUBLE-HOUSING PLANERS



HAVE THE EXACT SPEEDS AND FEEDS YOU NEED FOR THAT WORK YOU WANT TO DO FAST

By turning a conveniently located hand-wheel, the operator of a Double-Housing Hy-Draulic Planer can get any feed-rate whatever in the specified range of the machine. Cutting speeds can be adjusted likewise at the hydraulic unit. Consequently it is easy for operators of Double-Housing Hy-Draulic Planers to get the *exact* combination of speed and feed needed for maximum production on each job.

Application of hy-draulic pressure to the table is smooth, direct and on a straight line parallel with the bed-ways. Cutting speed and pressure are maintained steadily throughout each chip, reversals are smooth, return-ratios high. There are no gears to shift in feed-changing; no rigid connections in table-drive to wear loose or transmit vibration, no costly special electrical equipment — the hydraulic driving unit takes a standard constant-speed electric motor. Double-Housing Hy-Draulic Planers are accurate, powerful, fast — guaranteed as to materials and workmanship. Write today for Bulletin 2504

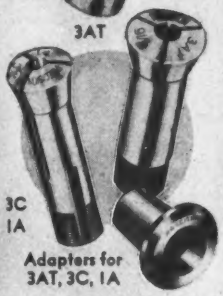
ROCKFORD MACHINE TOOL CO., ROCKFORD, ILLINOIS

WHEN COLLET WORK IS INDICATED - SPECIFY

Precision Collets

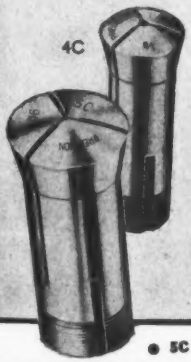
For 10" ATLAS & LOGAN, SOUTH BEND, SHELDON, CRAFTSMAN, POWR-KRAFT, CLAUSING and other important lathes.

IMMEDIATE DELIVERY FROM STOCK

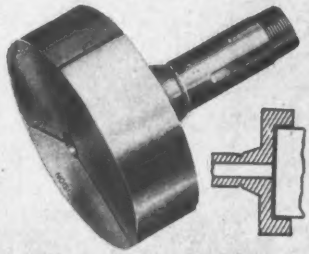


The *Precision* name on a collet is your unconditional guarantee of accuracy in machining, hardening and grinding. Make sure then to specify *Precision* when ordering from your dealer. Literature on request.

- MODEL 3AT: For 10" Atlas, Logan, 12" Craftsman, No. 700 Powr-Kraft.
- MODEL 3C: For 8" & 9" South Bend, Clausing, Hardinge No. 3, 10" LeBlond, etc.
- MODEL 1A: For 8" & 9" South Bend.
- MODEL 5C: For 9", 10", 16", 18" South Bend, 1" capacity Sheldon, Schauer, Sebastian, etc.
- MODEL 4C: For 14½" South Bend, ¾" capacity Sheldon, Hardinge No. 4, Elgin, etc.
- MODEL 480: For Logan Screw Machine, Turret Lathe and attachments; Warner & Swasey No. 1, etc.
- BREN Collet: For Handwheel & Lever-Type Speedichuk.



KLUTCH - KOLLET (Step Chuck) for chucking work to 2¼" diameter with collet accuracy. Head unhardened for easy boring. Fits 3AT, 3C, 1A adapters only. List unbored $7.50 each.



● 5C KLUTCH-KOLLET NOW READY. List Unbored $10.50.

GENERAL DIE-STAMPING-TOOL COMPANY 262 MOTT STREET, NEW YORK 12, N. Y.

3 NEW CLAMPS

added to
KNU-VISE LINE

MODEL KV 210—*An improved light-duty, large-capacity clamp used principally in aircraft, automotive equipment, machinery and furniture clamping.*

MODEL KV 216—*Having straight base, this model offers wide range of mounting possibilities — upright on side, or at any angle.*

MODEL KV 221—*Especially designed for cases where extra pressure is required for clamping at angle to base.*

Typical of all Knu-Vise Clamping devices—these clamps are designed to provide speed in clamping. Once set for desired pressure, the clamps apply pressure instantly and release it just as quickly with one lever motion.

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INCORPORATED

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4328 San Fernando Rd., Glendale, Calif.

"paid for itself the first week - - -
running continuously for ten months
without service cost - - -"

FOUNDRY and MACHINE COMPANY
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Thomas

PATENT APPLIED FOR

TAP EXTRACTOR and METAL DISINTEGRATOR

for PRECISION ARC-BORING

". . . paid for itself the first week"—sounds fantastic, but it's true. THOMAS will pay for itself in your plant, too, performing all these operations, and more:—

¶ Remove broken or imbedded Taps, high-speed Drills, Reamers and Studs without damage to valuable work-pieces. ¶ Drill holes and cut slots, keyways and channels in the hardest metals made by man, after heat-treat. ¶ Scarify and drill holes in hardened dies. ¶ Pierce armor plate.

Easy to operate—No adjustments—Low operating and maintenance costs—4 Models to fit any price or operating condition—Super Model shown.

Let us prove, in your own plant, that only THOMAS solves your (W)Hole problem. No obligation, of course.

SEND IN COUPON FOR LITERATURE OR A DEMONSTRATION IN YOUR PLANT

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CLINTON MACHINE COMPANY
Clinton, Michigan

Gentlemen:
Please send literature on Thomas Tap Extractor and Metal Disintegrator. ☐ We would like a demonstration in our own plant. ☐

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The smooth action and perfect control of ABRASIVE No. 3-B Surface Grinder contribute greatly to the productive capacity of this versatile machine. Its fast automatic feed and built-in shock absorber permit production of uniform, accurate work with utmost efficiency. The massive one-piece bed casting insures perfect alignment, freedom from distortion and long machine life; oversize spindle of alloy steel, precision ground, drives 10" grinding wheel with minimum vibration. Engineered and built to ABRASIVE's high standards.

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Work capacity:
24" long x 8"
wide x 12" high

ABRASIVE

ACCURACY BOOSTS PRODUCTION

ABRASIVE MACHINE TOOL CO., EAST PROVIDENCE 14, R. I.

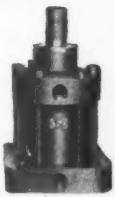
INDUSTRY SPECIFIES

T-J CYLINDERS

... FOR TOUGH JOBS IN POWER MOVEMENT

A T-J Cylinder has a vital job on this Pressure Contour Forming Machine! Used with various fixtures for producing contours in aircraft wings, fuselage, tail body parts and similar structures.

FOR PUSH-PULL-LIFT JOBS...100 LB. OR 50,000 LB.



Today—more and more tough jobs in power movement throughout industry are geared to T-J Air and Hydraulic Cylinders!

Whether it's pushing, pulling, lifting, clamping or controlling... T-J Cylinders simplify the job and speed up production! Ideal for machines and equipment such as presses, hoists, shears, valves, brakes, hopper gates, ovens —or any place where efficient *controlled power movement* is needed. Many standard sizes and styles...both cushioned and non-cushioned types. Precision-manufactured to deliver smooth dependable power in every stroke —with utmost dependability and long life! Write for latest catalogs. The Tomkins-Johnson Company, 620 Mechanic Street, Jackson, Michigan.

FOR TOUGH JOBS SPECIFY T-J

TOMKINS-JOHNSON

RIVETORS . . AIR AND HYDRAULIC CYLINDERS . . CUTTERS . . CLINCHORS

The JIGMIL has proven to be a totally new approach to the problems of economical precision BORING and milling of tool and production work

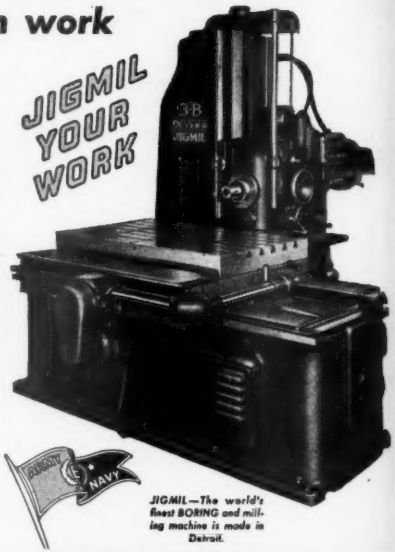
THE fastest producing and most accurate machine in the field.

Many users are reporting consistent experience of two to three times the output and higher quality work.

Automatic positioning of spindle from one location to another in response to measuring rods and push buttons to within less than .0001 (one ten-thousandth part of an inch).

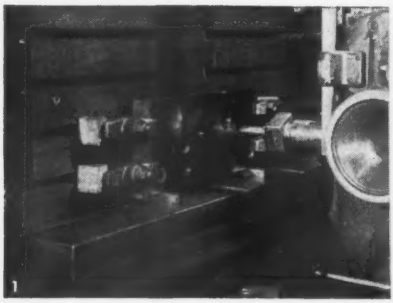
Feather touch, pressure controlled slide locks that positively control locking uniformity, so essential to high precision work.

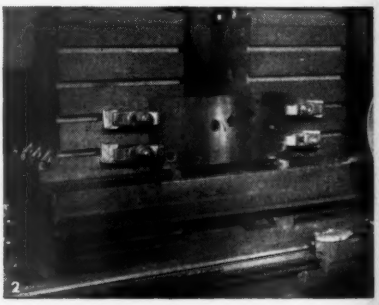
Unique operation and controls that make possible high precision work with relatively little skill.



JIGMIL—The world's finest BORING and milling machine is made in Detroit.

★ ★ ★





★ No. 1—Illustration showing convenience of jig plate boring. No. 2—Eight holes precision bored. Holes spaced within .0001 with total dependence of all spacing on automatic positioning means.

DeVLIEG MACHINE COMPANY DEVLIEG JIGMIL **450 FAIR AVE. FERNDALE 20, (Detroit) MICH.**

LISTEN BROTHER, IF YOU WANT TO BE SURE THAT YOUR MACHINE IS SETTING ON AN EVEN KEEL, THIS LITTLE LEVELING JACK WILL SET HER RIGHT FASTER'N YOU CAN BAT AN EYE!

Empco JACK

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If you're setting up machine tools, special machinery, large surface plates, large assembly fixtures or tool room and production equipment, etc., you can save time *now* and much re-leveling time *later* by using *EMPCO machine Leveling Jacks.*

Immediate Delivery

SIZES AVAILABLE
No. 1...2 " normal height
No. 2...2½" normal height
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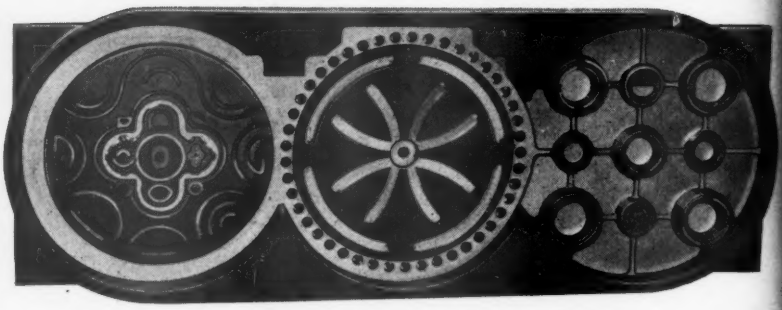
THE ENTERPRISE MACHINE PARTS CORPORATION
2735 JEROME AVE. DETROIT, MICH.

FORTY-SIX OPERATIONS ONE WORK SET-UP

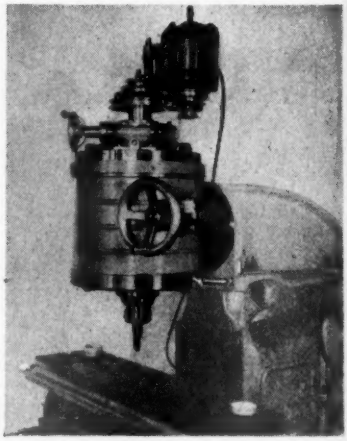


Size: 21" x 7". Time: 6 hours, including layout.

Matthew Rotary Tool Carrier

●Most vertical milling machines and attachments have fixed spindles which usually require a rotary table and a new, time consuming set-up for each operation. ●The Matthew Rotary Tool Carrier is movable either in a fast, direct manner or by worm and wheel so that a job can be completed with a single set-up. For straight line cutting, however, the cutter spindle can be solidly locked, the lock going around the full diameter of the outer body. ●Work is first scribed out. After each operation, the cutter spindle is quickly returned to dead center, checked by means of a spindle lock. It is then reset for the next operation. ●Positive, fool-proof, the Matthew Rotary Tool Carrier saves precious time on every job while maintaining the highest standards of precision. ●Recommended especially for fast, economical, precision machining of Plastics Molds; Metalworking, Die Casting and Forging Dies and Metal Patterns. *Descriptive Circular on request.*

PRODUCTION MACHINERY DEVELOPMENT COMPANY
4849 St. Aubin Avenue, Detroit 7, Michigan



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Circular Capacity—7 inch diameter.
Tool Capacity in Steel—1 inch end mill.
Spindle Speeds—600 to 2800 R. P. M.

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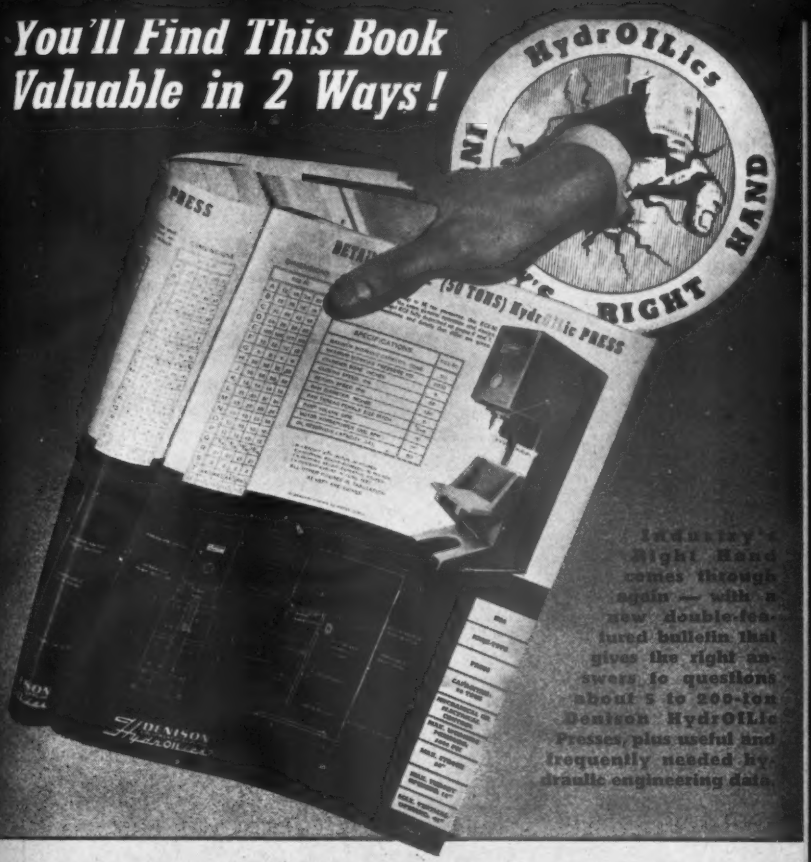

Industry's Right Hand comes through again — with a new double-featured bulletin that gives the right answers to questions about 5 to 200-ton Denison HydrOILic Presses, plus useful and frequently needed hydraulic engineering data.

Yours For The Asking — This new bulletin is packed with the kind of *complete* hydraulic press data you want. Note in the typical page above how the conveniently tabled specifications and detailed drawings give you facts *quickly*—without fuss or frills—on Denison's complete line of standard HydrOILic presses in the 5- to 200-ton range. And in addition, you'll find the tables on pages 19 to 29 a most helpful collection of hydraulic engineering data. Write for your copy of this new bulletin today . . . on your company's stationery, please. The Denison Engineering Co., 1197 Dublin Rd., Columbus 16, Ohio.

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A precision machine for precision work . . .

Phenomenal performance of this precision shaper in war production work is an indication of its great value in the postwar period when your competitive conditions put added importance on accuracy and low-cost production . . . The precise accuracy of work turned out on an Ammco 7" Shaper assures precision production unsurpassed by larger machines selling for hundreds of dollars more than the Ammco . . . In addition to low initial cost, you also effect big savings in time and expense on set-up operations . . . You save on electrical power consumption . . . You save on floor space—all without sacrificing quality or accuracy . . . Available for bench installation, or as a portable unit.

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TOOL and DIE

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TO SAVE TIME, MATERIAL AND AVOID PRODUCTION DELAYS

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PIONEERS IN TOOL AND DIE WELDING ELECTRODES

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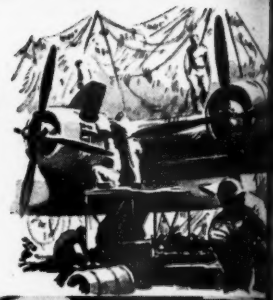
FLYING MACHINE SHOPS BACK UP THE B-29'S



Interior views of a Commando Flying Machine Shop of the XX Bomber Command equipped with a South Bend Lathe. *Official U. S. Army Photos.*

Flying machine shops are playing a vital behind-the-scenes role in the operation of the B-29 "Superfortresses" now carrying on the air offensive against Japan.

With ordinary repair facilities, it takes days or even weeks to repair bombers grounded away from their bases—often they have to be abandoned. Now Curtiss Commandos fly machine shop facilities to these planes, enabling them to quickly return to their bombing missions. These flying machine shops, through the diversity of their metal working equipment, are performing every type of repair work except the complete rebuilding of engines and planes.

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● Close-limit machine work calls for inspection standards regularly checked and re-established wherever necessary. Equipment for this kind of gage-testing used to be very costly. But not now. Johansson Gage Blocks are priced as low as $23 a set, with case—$3.50 for single blocks. They come in accuracies of .000004 and .000008. They will put your shop on a basis of enduring accuracy. May we send you a catalog with full details—sizes, accessories, prices? Write today.

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Every shop that works to thousandths or closer—whether on production, adjustments or repairs, needs—

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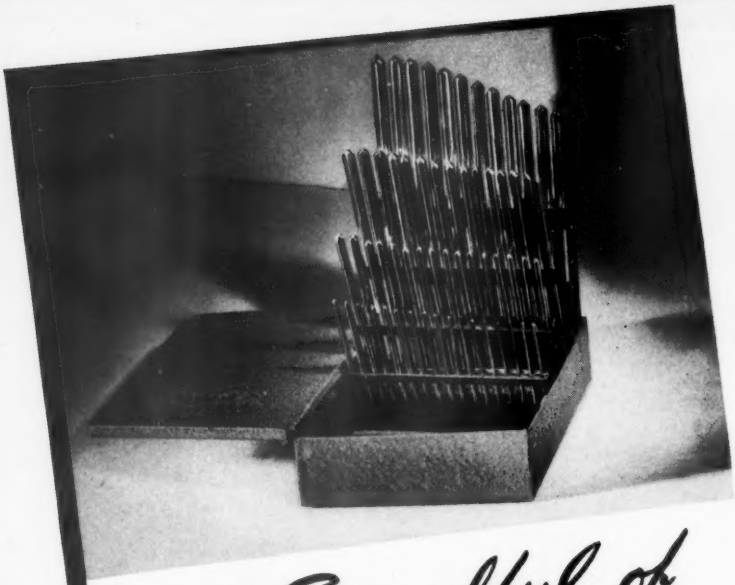

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This matched set of sixty L & I Ground Flute Reamers in Wire Gage sizes is only part of the L & I Line of Better Reamers.

They're better, because L & I specializes in ground flute reamers — ground *after* the solid bar is heat-treated and uniformly hardened. This gives a perfect cutting edge that stands up far longer than ordinary milled flute reamers.

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L&I GROUND FLUTE REAMERS

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SAVE TIME AND MONEY THESE 5 DIFFERENT WAYS

This small compact electric furnace is inexpensive, handy and easy to operate—ideal for small tool and die shops—saves time these five different ways:

1. Eliminates delays in sending small machine parts out to overcrowded commercial heat treaters.
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3. Cuts handling time when normalizing or annealing small parts. No waiting.
4. Conveniently available for pre-heating for subsequent high-speed hardening.
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AVAILABLE IN TWO SIZES

Type	*Chamber Capacity*	*Amps 115 V*	*Watts*	*Amps 230 V*	*Price*
MH-3	8″W 6″H 14″L	29.6	3400	14.8	$124.00*
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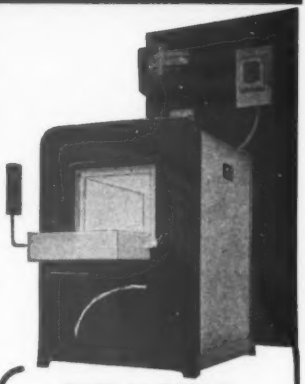
**Includes Hearth Plate*

MAX. SAFE TEMPERATURE—Continuous operation, 1750° F.; Intermittent operation, 1850° F.

AUTOMATIC CONTROL—Indicating Controlling Pyrometer—Thermo-couple and lead wire complete—$152.40.



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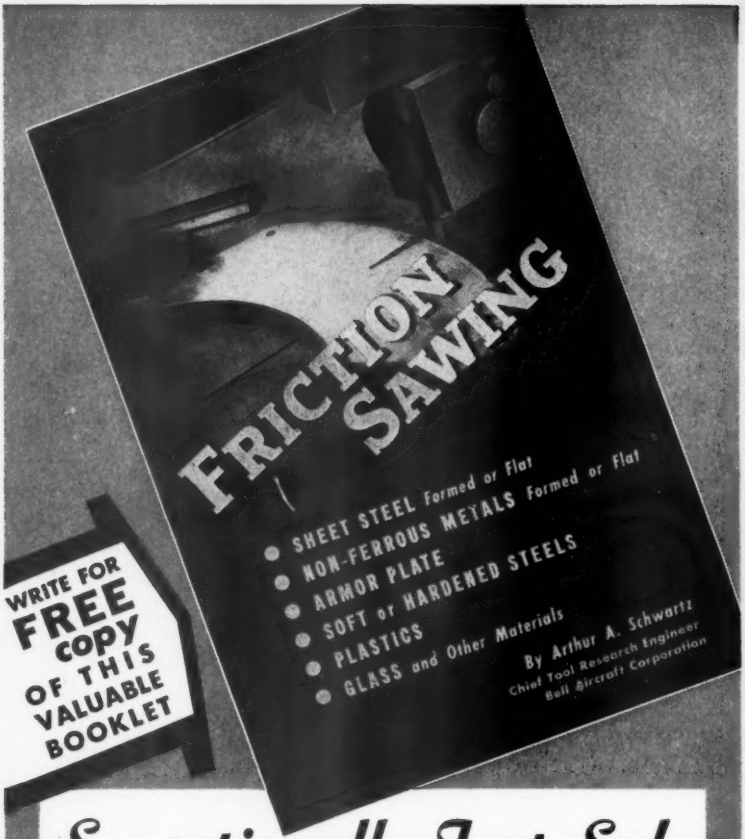

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this method is rapidly displacing other cutting methods. Learn all about it and the machines that make it possible —

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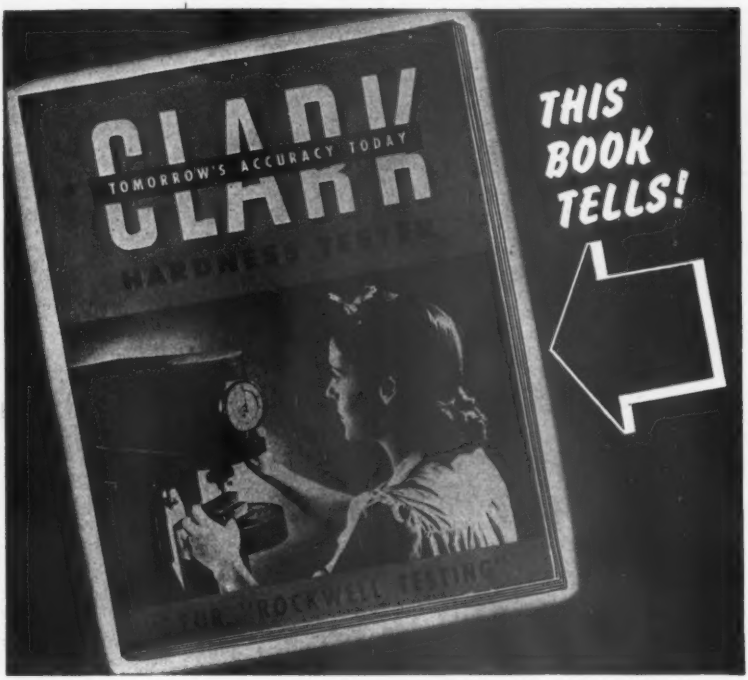
DO YOU KNOW THE TRUTH

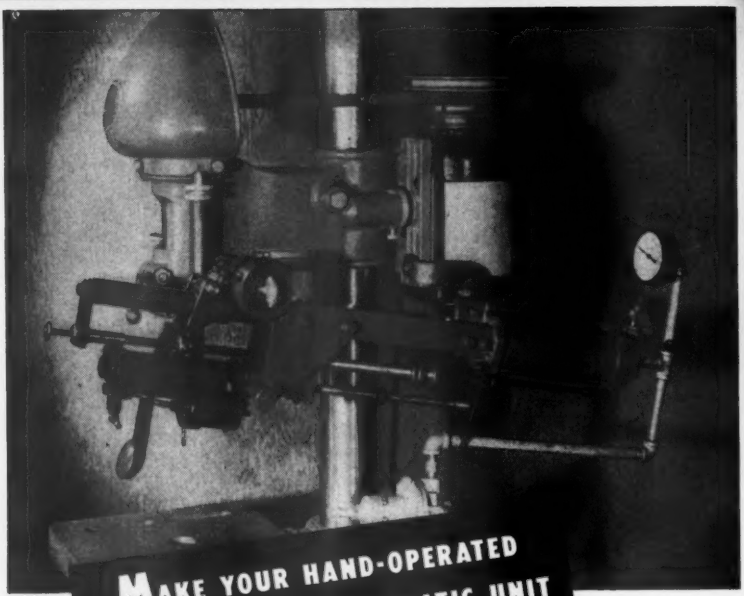
About Hardness Testing?



The new Clark catalog is more than a catalog.

It is a 20-page reference manual on the history, theory, practice, and equipment for modern, scientific hardness testing. Printed in two colors, 8½" x 11", it is available without charge to manufacturing executives. Just drop a line on your letterhead to Department TD, CLARK INSTRUMENT INC., 10200 Ford Road, Dearborn, Mich.

CLARK
TOMORROW'S ACCURACY TODAY
HARDNESS TESTER



MAKE YOUR HAND-OPERATED DRILL PRESS AN AUTOMATIC UNIT

A Bellows Controlled-Air-Power Drill Press Feed quickly converts a hand-operated drill press to an automatic production unit. All the operator has to do: insert the work, touch the handle. The Bellows Drill Press Feed will automatically advance the tool to the work, feed it through the work at just the right rate of speed with smooth, cushioned air power. When the operation is completed the spindle automatically retracts, ready for the next work piece.

You'll get more production, and better production: your drills or tools will stay sharp longer, and you'll break fewer of them. Even inexperienced operators will turn out first quality work, fast, safely, when your drill presses are equipped with Bellows Feeds.

HERE ARE THE DETAILS

Independent speed controls for spindle feed and retraction. Accurate depth controls. Can be used with or without Bellows Hydro-check (hydraulic resistance unit used to check feed at break through or to compensate for inequalities in stock hardness).

Two Models: Model BF-60 gives up to one revolution of pinion shaft. Model BF-90A gives up to one and one-half revolutions of pinion shaft.

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All Prices F.O.B. Akron, Ohio

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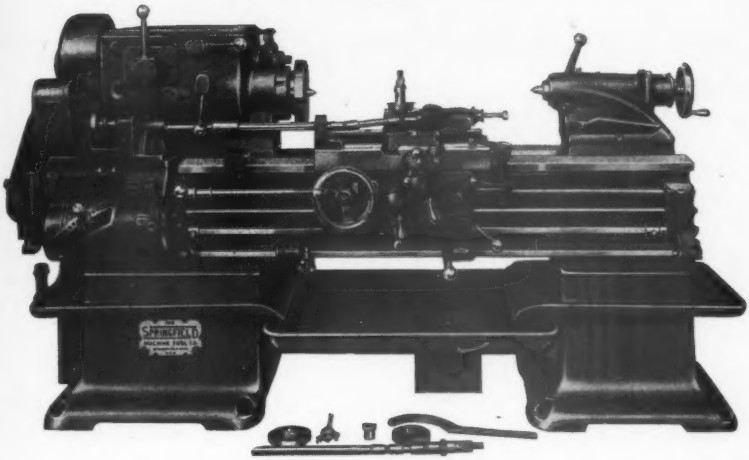
SPRINGFIELD PRECISION LATHE

Out in front!



● Headstock . . . twelve speeds . . . only half of the easy-shifting spur gears mesh at one time.

Motors . . . V-Belt or silent chain drive.

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Apron . . . extra heavy—operates on Ball and Bronze bearings throughout.

Taper attachment . . . hair-trigger adjustment.

Compound rest . . . sturdy, firm.

Tailstock . . . all bearings and bed ways oiled from one well.

From headstock to tailstock—the SPRINGFIELD Lathe is *out in front!*

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Tells the why and how of Springfield's accurate production.

THE SPRINGFIELD MACHINE TOOL CO.

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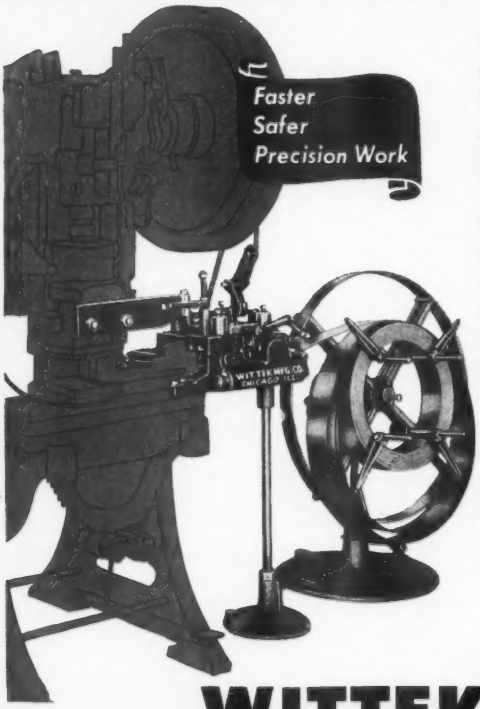
Planning Peacetime Production Using Coiled Strip Stock?

Equip with
WITTEK
Automatic Roll Feeds and Reel Stands



Wittek Roll Feeds are being used extensively by war plants in their large volume production of high quality metal stampings. The flexibility of Wittek Roll Feeds will assist these plants in their peacetime conversion through their adaptability to various jobs. Keen competition will demand the utilization of equipment to its point of highest efficiency. If your postwar plans include punch press production of parts from coiled strip stock—investigate now the many possibilities of Wittek Roll Feeds and Reel Stands.

Write for catalog, prices and recommendations

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Automatic
ROLL FEEDS
AND
REEL STANDS

This KRW Hydraulic Arbor Press was specially adapted for straightening propeller shafts of great length. On this particular unit a Speedi-booster was not deemed necessary to the operation. Perhaps a variant of this unit will fit into your production planning.

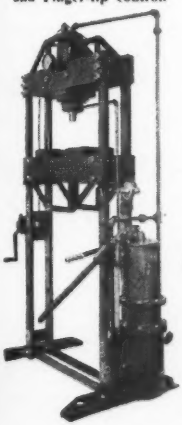
STRAIGHTEN OUT PRODUCTION KINKS

Cut Costs WITH KRW HYDRAULIC PRESSES

WAR-PROVEN ADVANTAGES OF LOW-COST KRW PRESSES ARE NOW BEING ADAPTED TO PEACETIME PRODUCTION SCHEDULES

Literally hundreds of adaptations of the standard KRW Hydraulic Arbor Press... in a great many industries... have definitely proven the many savings that accrue from the use of these highly versatile presses. In a great many cases, special KRW Presses have replaced heavier, outmoded equipment at a fraction of the cost.

75-ton KRW Press equipped with patented Speedi-Booster and Finger-tip control.



Standard KRW Hydraulic Presses are made in 25, 50, 60 and 75-ton capacities. For special applications, these presses can be engineered to solve a specific problem... either hand operated, air-oil, electric-oil operation or in any combination. This equipment is so flexible that we have been able to design, build and ship special presses in a matter of weeks. Bring your special problems to us. We have the experience and facilities to give you *fast action.* Write for our Hydraulic Press Bulletin. K. R. Wilson, Dept. 18, 215 Main St., Buffalo 3, N. Y.

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GOOD DELIVERIES ASSURED!

Blanks up to 1½" are cast Stellite—over 1½" are welded Stellite.

Now Perfex gives you Stellite gages that are *guaranteed* for their finer *accuracy* and *longer wearing qualities* plus the following features: 1. Can be used under various temperatures without affecting accuracy. 2. Less adhesion to materials being gaged. 3. Resists fumes and acids. 4. Requires no oiling to prevent corrosion. To save time and money on that next gaging job, remember to specify Perfex Stellite Gages.

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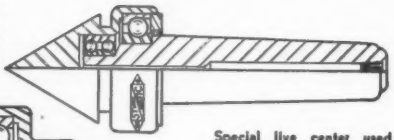
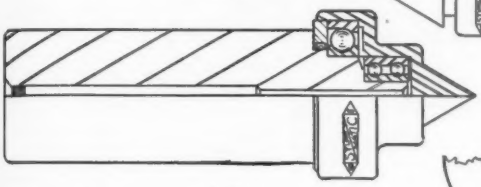
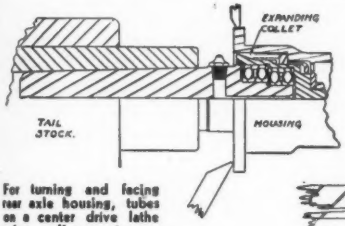
Send us your specifications and blueprints—We will see that your job is set up with the right LIVE CENTER.



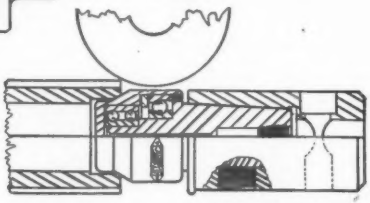
Special live center used for turning various sizes of tubing, pipe, etc.



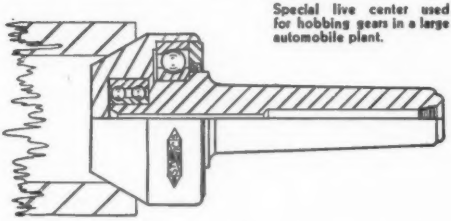
Special live center used in Warner & Swasey screw machines.



For turning and facing rear axle housing, tubes on a center drive lathe using a live center on each end, machining both ends simultaneously.



Special live center used for hobbing gears in a large automobile plant.



Special live center for turning extra large tubing.

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SCHERR MICROMETER PARALLELS

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SIX MICROMETERS — 1" TO 6" INCLUSIVE with a reference standard gage for each micrometer. In a sturdy hardwood fitted case.

These are the famous REED MICROMETERS that give you READINGS to 1/10,000" in 1", 2", and 3" sizes with accurate vernier, and 1/1000" in 4", 5" and 6". All have ratchet and spindle lock. Decimal equivalents of fractions of inch inscribed on thimble. Also available in metric reading, to 1/100 MM.

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Checked any way you wish, these Reed Micrometers will be found accurate to highest standards, with a ruggedness that fits them for hardest production service. Write us for full details, or order direct for quick delivery.

COMPLETE SET, **$64.54**

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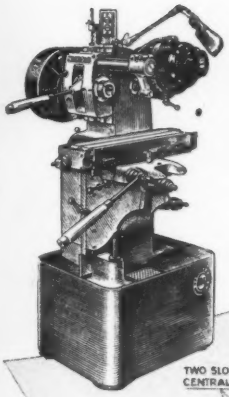
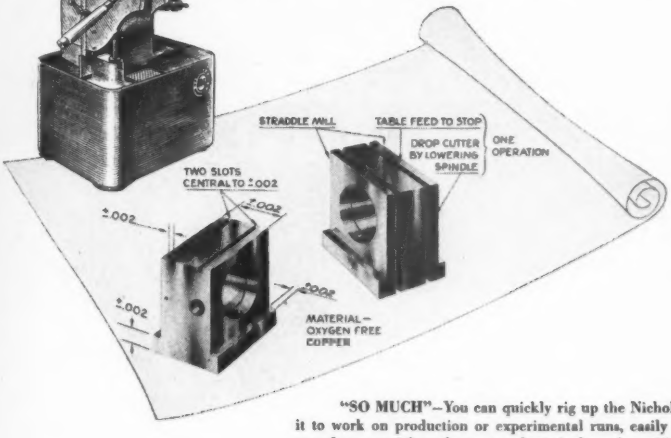


This Hand Miller Does So Much for So Little



"SO MUCH"—You can quickly rig up the Nichols and put it to work on production or experimental runs, easily change it over from one job to the next and put it through a wide range of milling, boring, turning and facing operations to tolerances in "tenths." The counterbalanced rise-and-fall spindle makes possible the use of simple fixtures. And the addition of lever, rack and pinion transverse feed, an exclusive Nichols feature, enables work to be chucked lathe fashion on the spindle with tools mounted on the table or vice-versa. As a result, the Nichols Miller often does the work of heavier, costlier millers, lathes, boring machines or grinders...more economically.

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THE NICHOLS MILLER

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WHILE the Shaper is indispensable in the toolroom, it is also very much at home in manufacturing shops.

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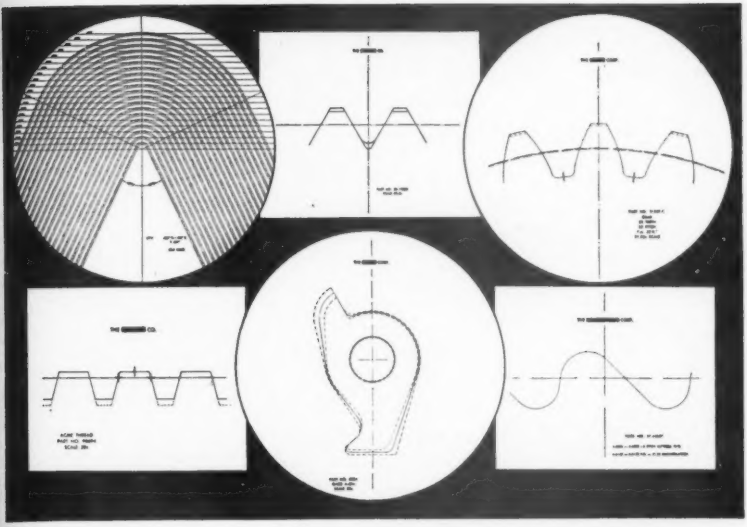
SHAPERS BRAKES SHEARS



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made to *Your Specifications*

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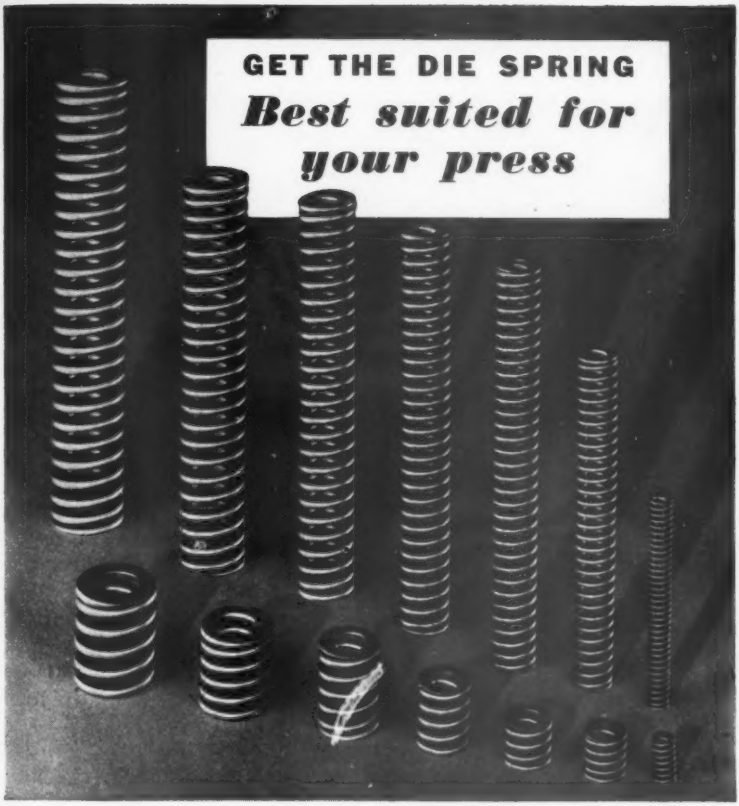
Uncle Sam is very much in the SCRAP business these days as you know. He especially wants scrap paper. Maybe a spring housecleaning at your place will uncover a lot of valuable file space and a load of urgently needed war material you didn't know you had. Take a look today!

TOOL & DIE JOURNAL



Designed to meet the rigorous requirements of your presses, Muehlhausen Die Springs of the proper sizes and types can assure you finer, faster die work.

Muehlhausen Die Springs are available in Series "S" for high speed; "M" for regular speed; and "HD" for heavy duty presses. Over 200 sizes are stocked, ranging from 1 to 15 inches in length, and exerting pressures from 80 to 3,000 pounds.

FREE BULLETIN!
New Die Spring Booklet describes 206 sizes and types of die springs.

Muehlhausen Spring Corporation
875 Michigan Ave., Logansport, Ind.
Send New Die Spring Booklet, Free.

Name_____

Address_____

City_____ State_____

MUEHLHAUSEN SPRINGS
EVERY TYPE AND SIZE

MOTORIZE

GEAR HOBBERS

MILLING MACHINES

DRILL PRESSES

LATHES

SHAPERS

BORING MILLS

ORIGINAL EQUIPMENT

with LIMA GEARSHIFT DRIVES for MACHINE TOOLS

Capacities 1 to 20 hp.

THE LIMA ELECTRIC MOTOR CO.

808 Findlay Road

LIMA, OHIO

REPRESENTATION IN MOST PRINCIPAL CITIES

LIMA GEARSHIFT DRIVES - LIMA ELECTRIC MOTORS

LIMA MAGNETIC POLISHING LATHES - LIMA PEDESTAL GRINDERS

Production ✓
Rework ✓

SAVE ON BOTH
with Oilstone Files

Production deburring is simplified and speeded up with oilstone files. Precision parts rejected for scratches or burrs can be quickly reworked within tolerance, even after hardening, with these "all abrasive" files.

You'll find oilstone files are *all file*, not just a surface of tiny cut teeth. Continued use constantly exposes new cutting points. Abrasive files cut hardened parts just as easily as abrasive wheels cut hardened tool steels.

India (aluminum oxide, oil filled) and Hard Arkansas (natural abrasive) Files, offer you a complete size and shape range of over a hundred items, with a finish spread from coarse, medium and fine India to the surgical fineness of Hard Arkansas.

Ask your Behr-Manning Field Engineer or your friendly distributor salesmen about them and write for your copy of our new 14″ x 18″ color chart, "Industry's Oilstones."

BEHR-MANNING • TROY, N. Y.
(DIVISION OF NORTON COMPANY)
Also Reliable Coated Abrasives Since 1872

For Precision Grinding and Sharpening

ROTOREX UNIVERSAL GRINDER

TOOL ROOM • MODEL SHOP • PRODUCTION

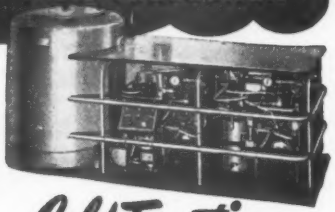
8" x 15" capacity. Variable spindle speeds ranging from 4500 to 6000 R.P.M., making the machine flexible and particularly suitable for delicate grinding jobs. Readily interchangeable attachments for single purpose jobs such as cylindrical, internal, and radius grinding, makes the Rotorex Grinder a universal machine for all kinds of grinding and sharpening operations.

Douglas Machinery Company, Inc.

150 Broadway, New York 7

PROMPT DELIVERY

HERE'S WHY SO MANY INDUSTRIAL MANUFACTURERS ARE USING COLD TREATING IN THEIR PRODUCTION



RESULTS OF *Cold Treating* with Deepfreeze Industrial Chilling Machines . . .

HARDENING OF METALS . . .

Drill life increased from 48 to 286 holes per grind.

Milling cutter life increased 17 hours per grind.

Form tool life increased from 150 to 510 pieces per grind.

Production increased from 3,000 to over 30,000 shell cases per punch.

STABILIZATION OF METALS . . .

Dimensional growth completely eliminated in gauges and all component parts of machine spindles.

Aluminum forgings and castings stabilized against distortion after machining.

Aircraft parts stabilized to work freely in low temperatures.

SHRINKING OF METALS . . .

Production doubled in shrink-fit assembly of airplane landing struts.

Production increased 250% in the shrink-fit assembly of a bushing in Diesel pistons.

Manufacturer saves $3,675 per year shrinking steel valve inserts.

TESTING AND MISCELLANEOUS USES . . .

Aircraft instruments and parts protested for substratosphere reaction save lives and time.

Cold treating economically removes pitch from optical lenses.

Deepfreeze machine used for storage of quenched aluminum parts until forming operations are performed.

Sub-zero temperatures are used for freezing rubber to permit easier machining.

Cold Treating

Improves Quality . . . Conserves Production Time . . . and Reduces Operating Costs . . .

COLD TREATING provides industry with a new production technique capable of effecting economies in a wide variety of operations. That's why it has found general acceptance by most of the country's leading manufacturers.

COLD TREATING is being used extensively by industrial organizations working with metals, to increase metal hardness and uniformity of structure—qualities that assure longer part life and better performance.

COLD TREATING is proving highly productive for shrink-fit assemblies by eliminating warping and scoring and saving time in such operations.

COLD TREATING is drastically reducing the time required to stabilize gauges, gauge blocks and other precision instruments. By following simple, standard procedures it is possible to completely stabilize various types of gauges in a few hours whereas formerly years were required.

COLD TREATING has scores of other uses for testing metals, instruments, lubricants, rubber and similar products for reaction under sub-zero temperatures.

The Deepfreeze –120° F Industrial Chilling Machine is designed to accommodate all of these industrial cold treating operations. Performance records furnish ample proof of the results obtained. A number of these are listed in the panel at the left. For complete data send for the 40-page Deepfreeze Cold Treating Booklet, described below.

How can Cold Treating be Used in Your Production ?

There's a way to find out. Send us a number of the tools or parts you're using. Submit information on the material and the heat treatment to which they have been subjected. We'll cold treat them, report the treatment to you, and return them for service and performance tests.

FREE . . . HERE IS COMPLETE INFORMATION ON COLD TREATING . . .

A 40-page treatise that includes everything from the history of Cold Treating to tested procedures. If you are acquainted with the subject, it will bring you up-to-date. If you're unacquainted, it will furnish you with the information you need to adapt cold treating to your production. Write today for your copy of Bulletin No. I-4.

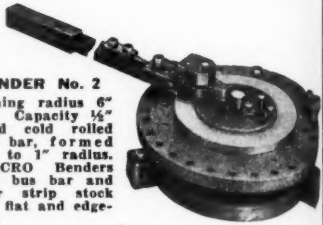
PRECISION CENTERED EYE BENDING with DI-ACRO BENDERS

A Centered EYE in 1 Operation

The DI-ACRO Bender makes perfectly centered eyes from rod or strip stock at a high rate of production. Both eye and centering bend are formed with one operation. Any size eye may be formed within capacity of bender and ductile limit of material.

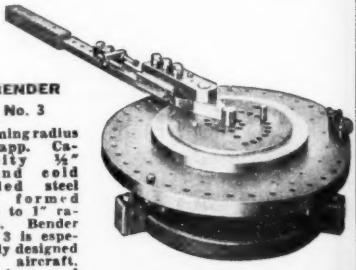
BENDER No. 1

Forming radius 2" app. Capacity 7/32" round cold rolled steel bar or equivalent. All DI-ACRO Benders have two-way action, right or left hand mounting and reversible forming nose.



BENDER No. 2

Forming radius 6" app. Capacity ½" round cold rolled steel bar, formed cold to 1" radius. DI-ACRO Benders form bus bar and other strip stock both flat and edgewise.



BENDER No. 3

Forming radius 9" app. Capacity ½" round cold rolled steel bar, formed cold to 1" radius. Bender No. 3 is especially designed for aircraft, marine and other large radius bending.

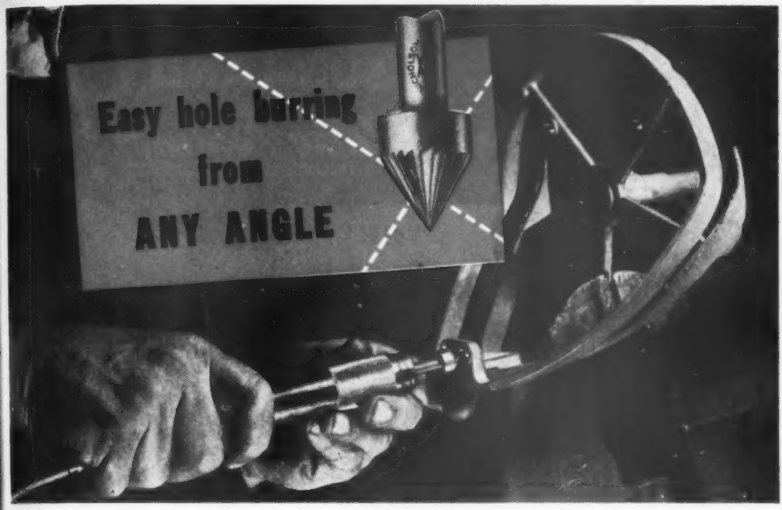
DI-ACRO IS PRONOUNCED "DIE-ACK-RO"

Send for Catalog **"DIE-LESS DUPLICATING"** showing many kinds of "DIE-LESS DUPLICATING" produced with DI-ACRO Benders, Brakes and Shears.

DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING

O'NEIL-IRWIN MFG. CO.

315 8th Ave. S.
Minneapolis 15, Minn.

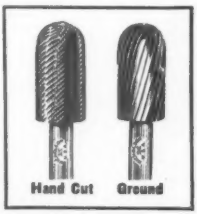


A Nicholson 60° Cone Shape Rotary File in the chuck of a portable tool offers just about the handiest, "time-savingest" method there is for burring or countersinking holes in irregular or unwieldy castings. The file must, naturally, be of larger diameter than the hole.

This shape is also used for the second operation (removing bur) on screw machine when cutting inside threads.

Most important thing about Rotary Files is, of course, *quality*. It is the first thing Nicholson thinks about, for quality is the priceless heritage of 81 years of Nicholson adherence to high file-making standards. You can be sure that Nicholson Rotary Files—whether Hand Cut or Ground—are *right* in every respect: Manufactured from high-speed steel; carefully shaped and true-centered; accurately cut and expertly hardened.

WRITE FOR CATALOG AND PRICE LIST—and for any special information you desire. For deliveries, consult your mill-supply house.



16 STANDARD SHAPES

(In either Hand Cut or Ground). 3 cuts—Coarse, Medium, Fine. 1/8" to 2" diameters.

NICHOLSON FILE CO. • 95 ACORN STREET
PROVIDENCE 1, R. I.
(In Canada, Port Hope, Ont.)

NICHOLSON ROTARY FILES

HAND CUT AND GROUND • FOR EVERY PURPOSE

NICHOLSON U.S.A.

Now.. A SUB-LAND WITH MANY *New Features!*

THE *Mohawk* SUB-LAND

Minimum size .200.

•

Maximum size, 3½" on small step.

At last, an accurate Sub-Land has been developed with the combined features that have been needed for years by the users of cutting tools—the Mohawk Sub-Land!

The Mohawk Sub-Land makes it possible to perform a greater number of operations with a single tool. It also makes possible a higher degree of accuracy because of the following features:

Each flute has a perfect circular land, ground from centers and extending over the full distance of the tool, guaranteeing absolute concentricity of steps.

Each step is individually fluted, which gives the tool longer life because the tool may be re-ground and used its entire length by simply "touching up" the cutting edges as they become dull.

All flutes are polished and provided with ample and positive chip clearance, overlapping cutting edges insuring perfectly square, clean corners and faces.

Mohawk Sub-Lands are not limited to any fixed number of flutes. For example, many Mohawk Sub-Lands are made with such combinations as 4 flutes on 1st step and 4 flutes on 2nd step; or, with 4 flutes on 1st step, 2 flutes on 2nd step and 2 flutes on 3rd step. By this One-Tool Control, inspection time, tool costs and rejects are reduced to a new "low".

NOTE: Mohawk Sub-Lands are built to individual specifications. Send part print or sketch for special design and quotation.

Detail of 3-step Sub-Land shown at left. It will bottom, chamfer and face, all at the same time.

Patents Pending on all Mohawk Sub-Lands

PROMPT SERVICE

•

Write today for Bulletin 50

Mohawk TOOL COMPANY

21647 DEQUINDRE ROAD • HAZEL PARK, MICHIGAN

this DoALL Vernier Block alone

MEASURES TO TEN MILLIONTHS and LESS

Here is the DoALL Vernier Gage Block in use in a difficult height gage combination, measuring to five millionths of an inch!

Here the Vernier Block, moved to the left, reduces the opening of this internal snap gage assembly by 20 millionths of an inch.

Every Inspector Should Have One

VERSATILITY IS ITS MIDDLE NAME

Here's the Vernier principle applied for the first time to gage block practice! The DoALL Vernier Block has a nominal size of 7-tenths of an inch but, by sliding its halves, will measure from .699900" to .700100" in gradations of 10 millionths of an inch (.0000010"). Halves (.000005"), thirds (.00000333" and .0000066"), and quarters (.0000025" and .0000075") can be estimated readily, and fifths (.000002") and tenths (.000001") easily with a magnifying light.

It's the handiest instrument you've ever seen. Once used, no inspector will do without it.

Where DoALL Gages are made

COMPLETE INSPECTION COURSE. EIGHT LESSONS FREE TO EACH PURCHASER.

HANDBOOK—Write for free copy of our new QUALITY CONTROL book.

DoALL

CONTINENTAL MACHINES, INC.
1303 S. Washington Avenue • Minneapolis 4, Minn.

Precision Grinding

IN THE TOOL ROOM
IN PRODUCTION

Designed for the Tool Room and Die Shop where precision workmanship is all important... Built with Boyar-Schultz quality, resulting in sturdiness that HOLDS accuracy, not only in tool and die work, but in production wherever accuracy is necessary.

PROTECT YOUR TOOL DOLLAR WITH THE FINEST

No. 618 SURFACE GRINDER
A sturdy, easy operating Surface Grinder, designed for the Tool Room and built to give positive precision performance over long periods of time.

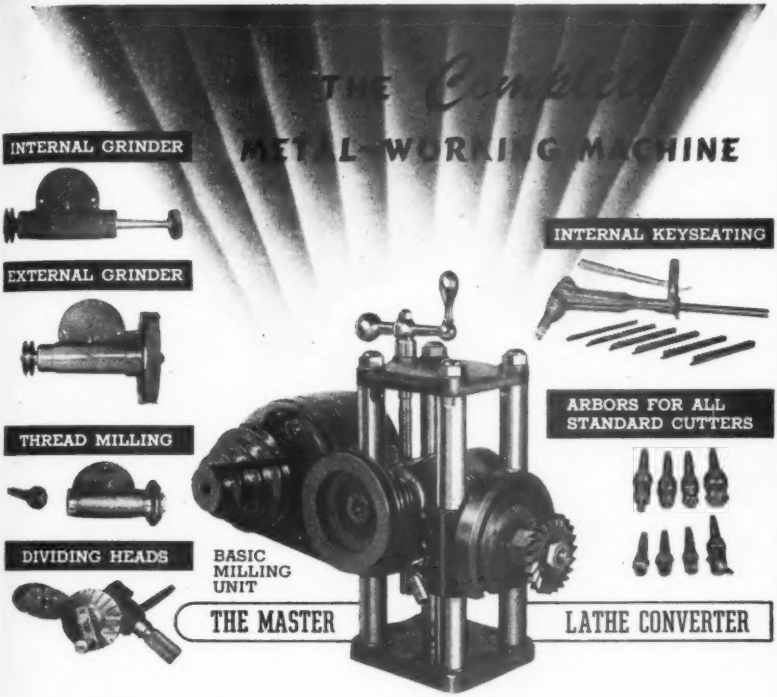
No. 1 PROFILE GRINDER
A bench size Profile Grinder. A time saver in grinding dies, punches, cams and templates. Operates at 20,000 R.P.M. A rapid stock remover.

No. 2 PROFILE GRINDER
A larger, heavier Profile Grinder with two independently powered spindles, operating at 10,000 R.P.M. with vertical oscillations.

WRITE FOR CIRCULARS DESCRIBING THESE MACHINES

BOYAR-SCHULTZ CORPORATION

2112 Walnut Street, Chicago 12, Illinois



PRECISION PERFORMANCE *in Milling, Grinding, Drilling, Boring, Threading and Keyseating*

The MASTER LATHE CONVERTER, with interchangeable heads, will perform almost ANY metal work operation. Designed primarily for Engine Lathes, it can also be used on Planers, Shapers, Milling Machines, and Boring Mills.

Rugged in construction, simple in design, and accurate in operation, the MASTER CONVERTER has proved to be the MOST ADAPTABLE machine tool for maintenance, repair, tool, and experimental departments on the home front and battle front — in every major branch of the armed services.

TIME and SPACE are at a premium — maintenance and production are essential — the MASTER CONVERTER is the answer. Why not investigate what this remarkable machine will do for you?

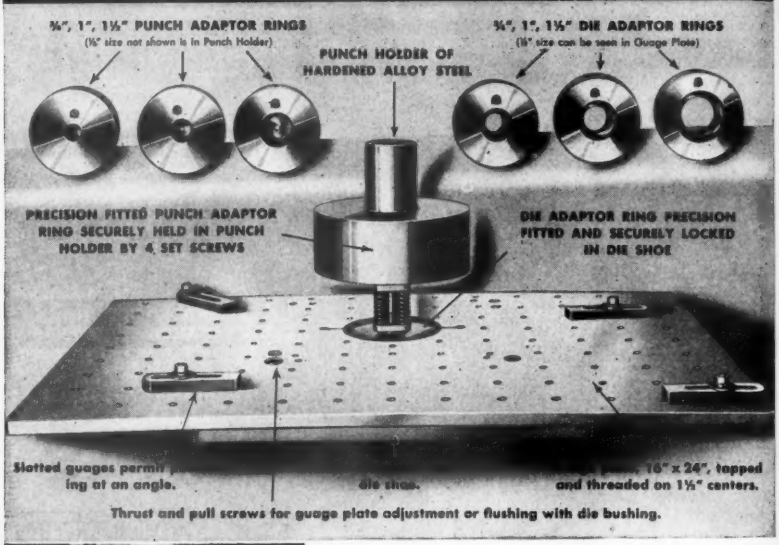
Catalog No. 10 Includes Operation and Maintenance Manual—ASK FOR IT!

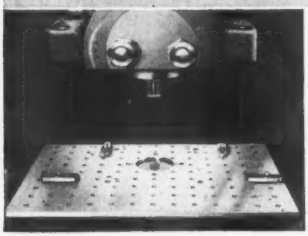
the MASTER MANUFACTURING COMPANY
HUTCHINSON, KANSAS, U. S. A.

MM LATHE CONVERTER

ADDRESS DEPT. TD

WHISTLER SINGLE HOLE PERFORATOR


¾", 1", 1½" PUNCH ADAPTOR RINGS
(½" size not shown is in Punch Holder)
PUNCH HOLDER OF HARDENED ALLOY STEEL
¾", 1", 1½" DIE ADAPTOR RINGS
(½" size can be seen in Guage Plate)
PRECISION FITTED PUNCH ADAPTOR RING SECURELY HELD IN PUNCH HOLDER BY 4 SET SCREWS
DIE ADAPTOR RING PRECISION FITTED AND SECURELY LOCKED IN DIE SHOE
Slotted guages permit
ing at an angle.
die shoe.
and threaded on 1½" centers.
Thrust and pull screws for guage plate adjustment or flushing with die bushing.



Shown above is the U-5015 Whistler Single Hole Perforator Set complete and at the left, the set on the press ready for production—the answer to quick and economical handling of many perforating jobs. It takes but a few minutes to bolt in the punch holder and position the guage plate and die shoe which are set on the press as a single unit. Punch and die adaptor rings of the four sizes are changed instantly by loosening then tightening two set screws. The same procedure is followed for changing sizes of punches and dies. Absolute precision is assured. Punches, dies and strippers are extra. Shipped within a few days in standard sizes from ½" to 1½" in round, square, oval and rectangle shapes for perforating materials to ¼" thick mild steel. Operating satisfaction is guaranteed by Whistler's 28 years of experience in the manufacturing of production perforating equipment.

Whistler Single Hole Perforator Unit complete F. O. B. Buffalo **$465**

S. B. WHISTLER & SONS, Inc. 752-756 Military Road, Buffalo 17, N. Y.
REPRESENTATIVES IN ALL PRINCIPAL CITIES

Get in touch with **WHISTLER** *for all types of sheet metal dies!*

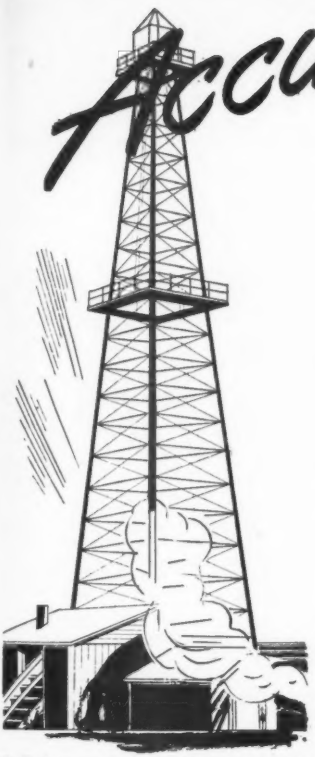
ACCURACY...

by Specialists in Accuracy

It has long been the privilege of The Pipe Machinery Company to work closely with suppliers of API products.

PM Gages are today helping these manufacturers maintain the high standards of precision dictated by the need for joints that are both *strong* and *tight*.

In buying gages that will aid you to sustained accuracy in your own product, you can safely be guided by the PM Diamond Emblem—a mark of recognized quality.



REAL STANDARDS

Because the Petroleum Industry talks about "pipe", few realize that its standards for precision threading are the most rigid of all large industries. Unusual co-operation between user and producer for 20 years has maintained these exceptionally high standards without sacrifice of economy in production. API (American Petroleum Institute) standards are real standards that set a pattern for all industries.

Write us for special gages made to your specifications. Large stocks of standard Plug, Ring and Thread gages are ready for quick shipment.

ARMY E NAVY

The PIPE MACHINERY COMPANY Cleveland, O.

SUBLAND OIL-HOLE DRILLS!

Straight Shank Subland Oil Hole Drill

Morse Taper Shank Subland Oil Hole Drill

Time Savers IN 2-STEP DRILLING

HERE'S a subland drill that can be operated at a much faster speed than ordinary subland drills because it is kept cool by a constant stream of oil forced through the shank to each of the cutting edges.

The extension of the oil-hole principle to subland drills now gives this type of drill the same advantages as those heretofore confined to the more simple types of drills. It marks a great advance in 2-step drilling.

Just as you can greatly reduce production costs by using a subland drill, you can still further reduce production costs by using a subland drill with the oil-hole feature, because it makes it possible to perform 2-step drilling in an appreciably shorter time.

Made to specifications—all sizes from ½" to 3½" in diameter and up to 36" overall. Please specify taper or straight shank.

•

DETROIT REAMER & TOOL CO.

2830 E. 7-Mile Road, Detroit 12, Mich.

Manufacturers of

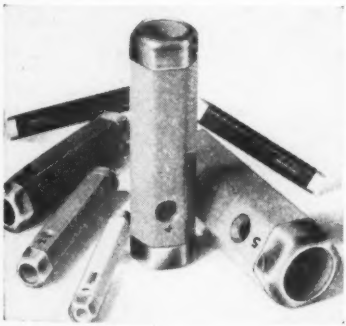
Oil Hole Drills Special Reamers
Circularity Relieved Reamers and End Mills
Also Special Tools

FEDERAL

Taperlock Plastic

GAGE HANDLES

Made of durable plastic material, one-third lighter than aluminum. This lightness permits a most sensitive "touch" with less fatigue . . . an advantage appreciated by women inspectors.



Federal Taperlock Plastic Gage Handles have proved very satisfactory for glass gages. Being so much lighter than metal handles, the danger of chipping and breaking is greatly reduced.

Plastic Handles insulate, protecting gages from bodily heat which might affect accuracy.

Easily marked for identification with the same tools used for marking metal handles. Available in SEVEN sizes—00 for small gages, 0, 1, 2, 3, 4 and 5. In FOUR colors — Red, Green, Yellow and Black.

IMMEDIATE DELIVERY
On Rated Orders

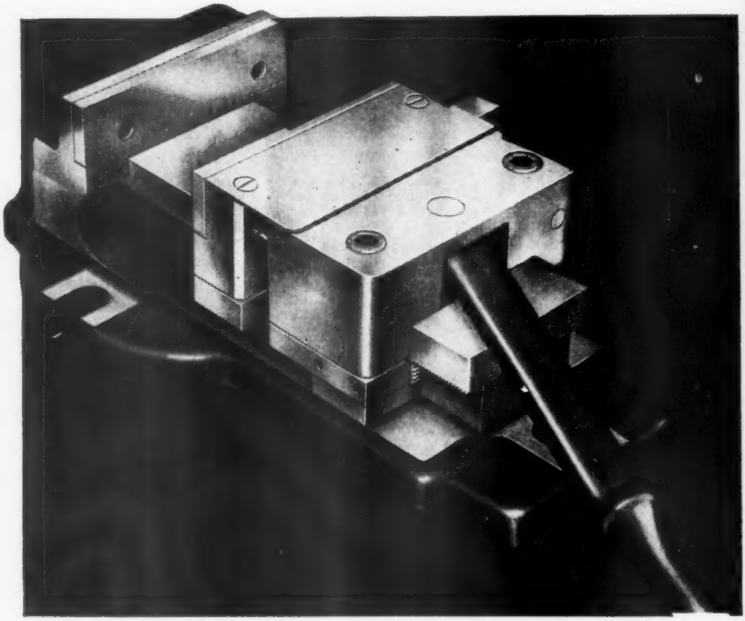
FEDERAL TOOL CORPORATION

400 NORTH LEAVITT STREET — CHICAGO 12, ILLINOIS

NEW UNIVERSAL WEDGE-LOCK PRODUCTION VISE

Assures instant, positive locking for milling machines and drill press work

A short 15-degree pull on the locking lever applies pressure through taper wedges to securely clamp work in the Universal Wedge-Lock Production Vise, the newest addition to the line of superior Universal tools. A second pull of only 7 degrees locks the piece firmly. Splined roller contact permits positive, secure locking of adjustable jaw in any position. • This new Universal Vise speeds production because its quick, easy operation reduces work change time 10% to 80%. Write for complete information.

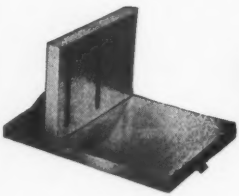


UNIVERSAL ENGINEERING COMPANY

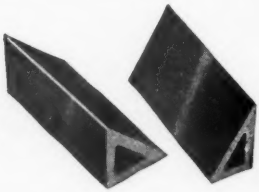
FRANKENMUTH, MICHIGAN — Fighter Plane Given by Employees — 20% Employee Bond Deductions

SOMETHING NEW HAS BEEN ADDED TO OUR LINE OF

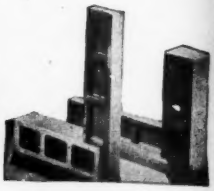
MEEHANITE METAL PRECISION PRODUCTS



Masterangle Plates



Angle Attachments

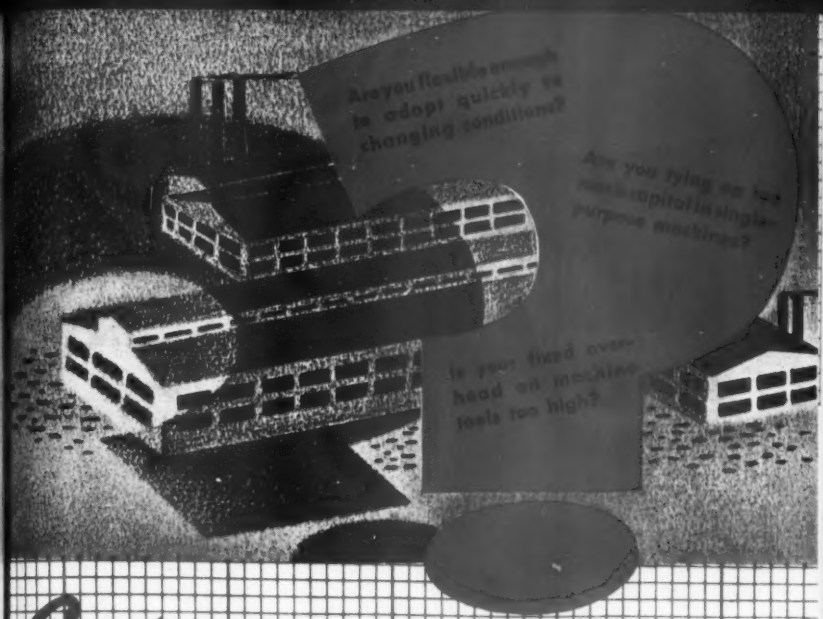


Try Squares

Write for Literature

ACME TOOL COMPANY

196 CHURCH STREET
NEW YORK 13, N. Y.


Are you flexible enough to adopt quickly to changing conditions?
Are you tying up too much capital in single-purpose machines?
Is your fixed overhead on machine tools too high?

Cut Your Investment Risk in Post-War Retooling

with this practical approach to the uncertainties that lie ahead...

Tool up with flexible, low-cost

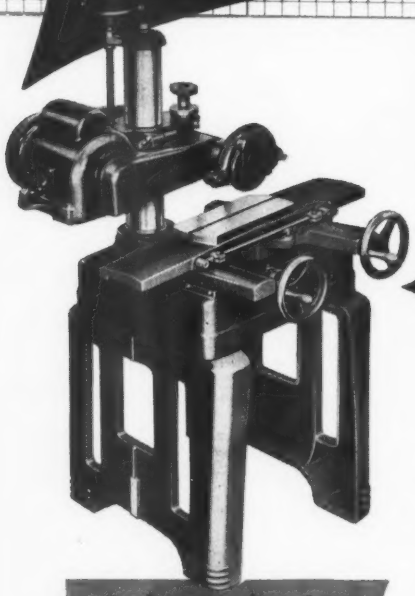
Delta-Milwaukee Machine Tools

HERE ARE THE MACHINES

You can extend the savings of DELTA-MILWAUKEE MACHINE TOOLS *to almost every department*

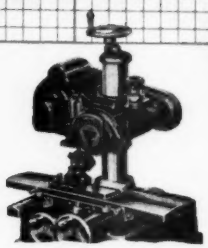
yet m

Wood

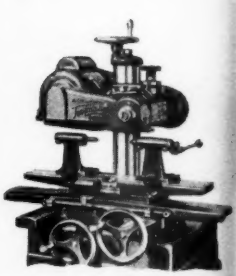


Delta Toolmaker Surface Grinder

Designed for ease and speed of surface grinding, tool sharpening, and any grinding operations within its range. Many famous Delta advantages that help assure you of creditable performance. 7" x ½" wheel; 1¼" bore. Table surface 5¾" x 13".



With the Univise* — and the coolant attachment — this machine serves as a dependable, accurate Chip-Breaker Grinder for grinding the chip-breaker groove on carbide-tipped tools.



With the Unihead*, and the tool and cutter grinder attachment, this machine becomes the latest development in Tool and Cutter grinding. Simple, accurate, very low in cost.

Consult your **DELTA-MILWAUKEE** *distributor regard*

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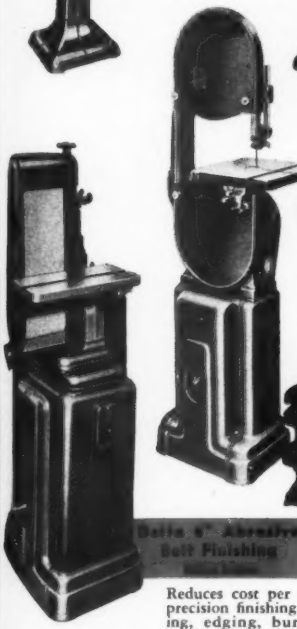

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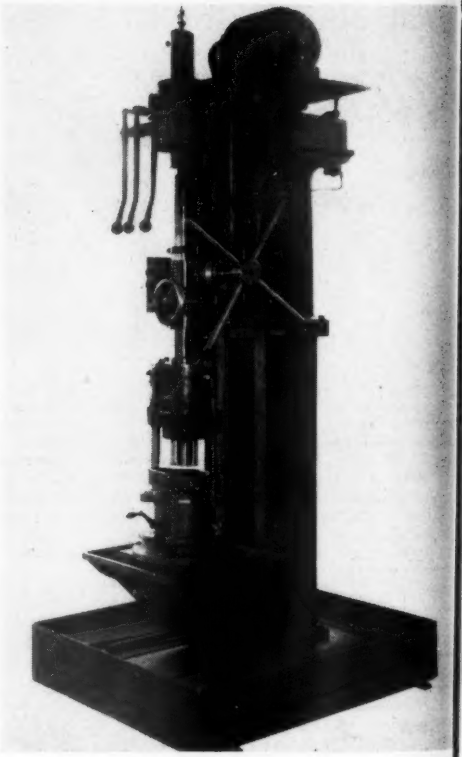

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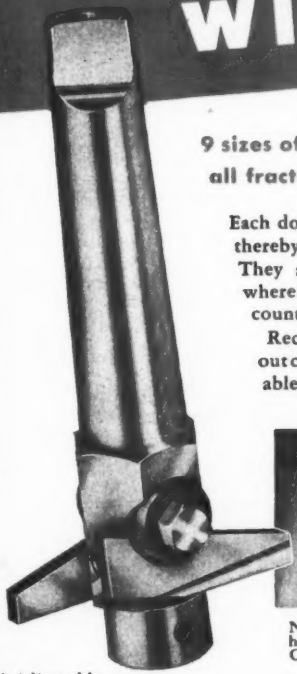

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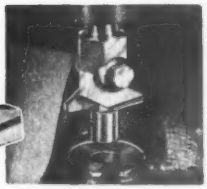

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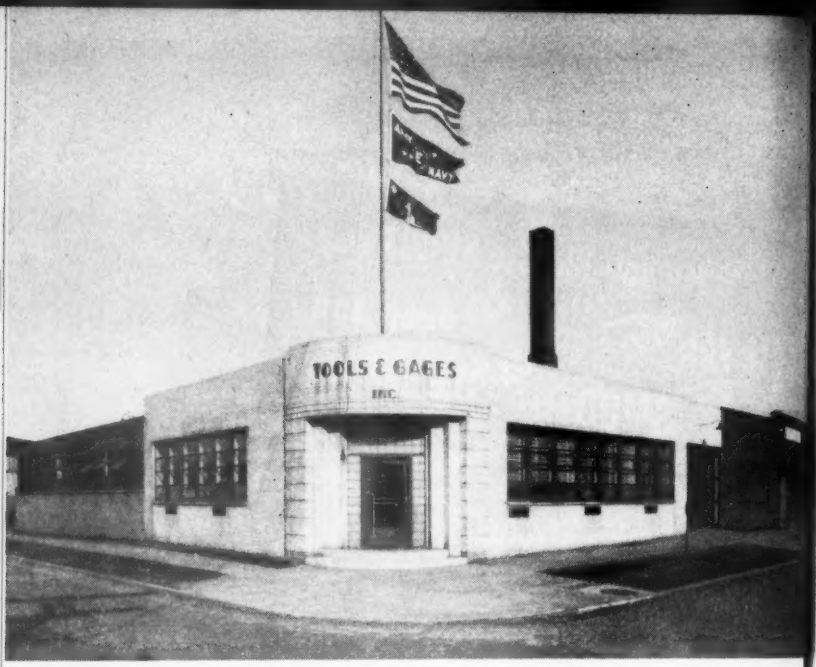

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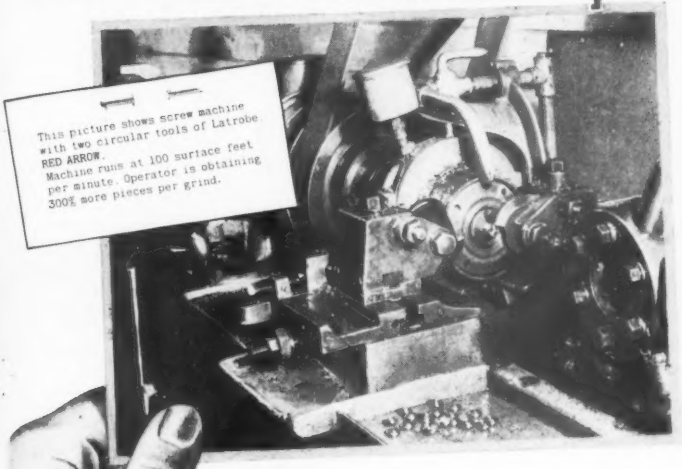
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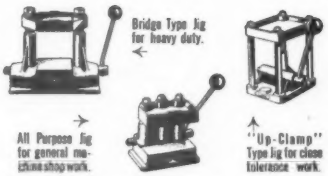

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You know him, Pal, as the man who took you for a run in the park when the leaves were falling. He's the tweed-suited chap who wrestled with you on the floor or read the paper while you stretched out at his feet. He's the fellow you're waiting for.

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HE'S THE SAME MAN

The anxiety regarding the effect on the future that spread throughout America following the death of Franklin Roosevelt gave way in a surprisingly short time to a feeling of calm. No doubt this resulted from the quiet matter-of-factness displayed by President Truman in his first official utterances to the Congress and the press after assuming the presidency.

Obviously, our new chief executive realized that his obligation to carry on in the place of his forceful, widely idolized predecessor meant that he faced an exacting test of human qualities. President Truman's self-reliant attitude, the profound sense of responsibility he has demonstrated and the evidence he has given of being an independent, constructive thinker, all in all, have got him away to an auspicious start.

Harry S. Truman came to the highest office this nation can bestow, without serious commitments. He was not elected president; he succeeded to the office by virtue of our constitutional law. Although some contend that since he was elected vice-president on the Roosevelt-Truman ticket, he might be considered as subscribing to the general principles enunciated by the Democratic party, there is reason to believe that he has his own convictions as to policies and procedures.

Naturally, American industry and business are vitally interested in the course he will take when he is no longer "carrying on" but reaches the point whence it becomes his duty to steer on his own account. It is not possible now, of course, to foretell how he will measure up on the long pull, but certain hints can be found as to his probable direction.

When President Truman was asked in his first press conference how he stood on several vital industrial and business problems, he is reported to have told his questioners to "look up the record of one Harry S. Truman in the Senate." Fortunately, this record touches in some degree upon most issues that ordinarily confront Washington statesmen; and it would appear that the president intends to stand on this record.

Only eleven years ago Harry Truman was a relatively unknown American serving as a county official in his native state of Missouri. His birth, his boyhood, his early manhood have been described as typically average-American. Recently, many writers have delved deeply into his past, and more than one has declared in effect that his modesty is "the humility of a genuinely religious person" and that it has nothing to do with indecisiveness or self-effacement.

Today, Harry Truman is President of the United States, and a world figure. But he is the same man who is recorded as having said, when seeking office as County Judge of Jackson County, Missouri, in 1922: "It isn't business and it isn't politics to run this county into debt and I want it stopped. I want it made a felony to spend money the County hasn't on hand."

He is the same man who, as a United States Senator, in an address on September 4, 1944, thus defined some of his views as they related to impor-

tant subjects of the day: "The future of labor can be very bright if full regard is given to labor's rights. I have fought for those rights and, come what may, I am going to continue to fight for those rights. But now a word of warning from a friend. Labor has duties as well as rights . . . . Like Caesar's wife, labor must be above suspicion. You must elect and follow wise leaders of proved integrity. Your contracts must be sacred. Above all else, you must turn in an honest day's work every day you're on the job, for it is only through production that you create goods that can be distributed among yourselves, a home that you will be proud to live in and a standard of living that will assure health and prosperity for your families."

President Truman is the same man who had this to say about our new war plants: "With these new plants added to those we had before the war, we can produce a wealth of peacetime goods beyond anything we ever dreamed of.

" 'But,' the Doubting Thomases say, 'this will flood the markets and exceed our purchasing power.' That will be true only if we foolishly block labor from consuming what it produces. What labor produces it should be able to purchase and enjoy . . . If a nation is to be run for profit first and the people second this fact of ever higher productivity means certain ruin, ruin for labor and ruin for business. But now reverse the order of importance, put human welfare first and profits second, and the same productivity which science has given us becomes the most wonderful phenomenon of our times. It then comes to mean prosperity for business, security for labor and a better way of life for all."

He later declared that the Government must make "a well-conceived and well-directed effort to encourage private business to utilize the plants . . .

"The factories are there. The tools and machinery are installed. Trained personnel are already at work . . . We have learned to produce many things cheaper and better than before. And we have the largest savings in our history with which to pay for what we need.

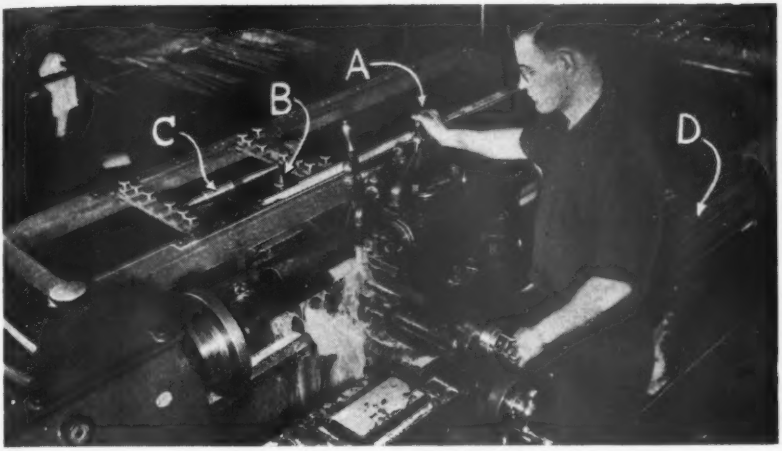
"In short, it is strictly up to us. If we have the courage and initiative to grasp these opportunities, this nation will prosper beyond anything our forefathers ever dreamed was possible. . . .

"But we must take advantage of our opportunities. By doing so we will have jobs enough to go around. It would be foolhardy to try to re-establish business in exactly the same patterns that existed before the war. We must go forward or fall behind. We cannot stand still."

This is an encouraging insight into the Truman economic philosophy. True, he has not had much experience with the great international problems; he does not make any effort to convey the impression that he is all-knowing, because he has repeatedly asked for the co-operation of all Americans. But he appears to be able and willing to draw to him others who can supply the experience and judgment his difficult job requires. He has shown he can make up his own mind and can assert himself when necessary.

"The record of one Harry S. Truman" reveals all this; the record is good; and President Truman is still the same man.

Geo. J. Hueber



Step Shafts Made on Contouring Lathe

by Clarence Johnson
Research Engineer
CONTOUR CONTROL DEPARTMENT
BAILEY METER COMPANY
Cleveland, Ohio

Methods used for the manufacture of step shafts depend largely upon the quantity of any one design which is to be made in one run. When very large quantities are to be made, special machines built specifically for that purpose are employed. These machines are automatic in their operation and are set to run for long periods of time.

There are, however, large numbers and varieties of step shafts which must be made in quantities too small to warrant the expense and setup time required by these long run methods of manufacture. In some cases sizes of shafts are too large for the special machines available, and in other cases management hesitates to invest in special purpose machinery which is not sufficiently flexible to permit its use on other operations.

A satisfactory and economical method for the manufacture of step shafts has been developed by the Reliance Electric & Engineering Company of Cleveland. This company, which manufactures ac and dc motors for industrial and marine service, uses an 18" lathe equipped with a Bailey Contour Control to manufacture step shafts.

The cutting operation is automatic from the time the feed control is thrown in until the control lever is returned to neutral at the end of the cut. The start of one of the cuts on a typical shaft is shown in Figure 1. Here the operator has just placed the feed control lever (A) in the automatic position so that the pneumatic tracer (B) will follow the master shaft (C) shown mounted on the templet rest behind and above the work. He is now free to leave his machine and place a dog on the next piece of the lot

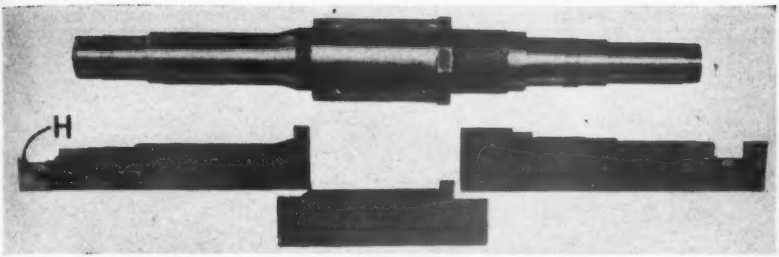
to be cut. After the lot is completed the time required to change the setup from one type of step shaft to another is a matter only of minutes.

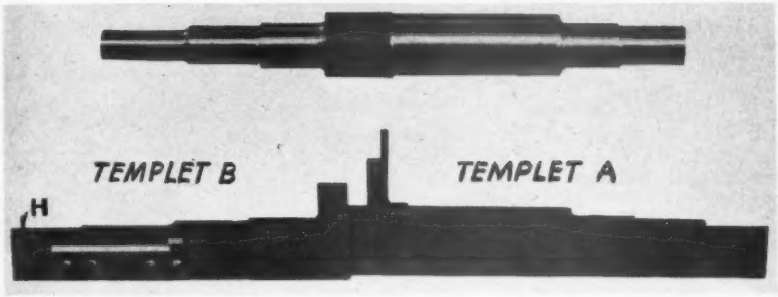
The Bailey Contour Control as applied to this lathe is powered by hydraulics. A 5" x 48" cylinder (D, Fig. 1) mounted on the lathe carriage, with its piston rod anchored to the lathe bed, operates the longitudinal feed and a 6" x 10" cylinder (E, Fig. 2) mounted on the carriage operates the cross slide. These cylinders are actuated by oil pressure at approximately 275 psi, controlled by hydraulic relays which in turn are controlled from the Bailey pneumatic tracer. The hydraulic relays (F) are shown mounted on the motor driven hydraulic power unit (G) shown in the back view of the lathe, Figure 2. This unit runs on a monorail and follows the motion of the carriage, maintaining a fixed relationship with the carriage as shown in the photograph. Characteristics of the system are: extreme accuracy in positioning the cutting tool, a wide speed range for both longitudinal and cross feeds, smooth stepless motion of the cutting tool and instantaneous inertia-free response to changes in contour. The longitudinal feed is infinitely variable from zero to 16" per minute and is adjusted by a feed control knob (K, Fig. 4).

Since the hydraulic cylinder drives have no rapidly moving or rotating parts, the effect of inertia both in starting and stopping is reduced to a minimum.

A further advantage of these drives is their ability to make instantaneous reversals of motion without having any screw feed backlash to take up, a feature resulting from the solid connection of both the carriage and the cross slide to the lineal motions of their respective hydraulic drive cylinders.

These characteristics together with automatic simultaneous control of both the longitudinal feed and the cross feed permit rapid or slow "in" and "out" motions of the cutting tool at sharp shoul-





ders while the longitudinal feed temporarily halts. After a shoulder is completed, the desired longitudinal feed as originally set automatically resumes. During the setup the speed of the cross feed is manually set for a rapid or slow "in" and "out" tool motion depending on the finish desired on the shoulders.

When the templet calls for fillets or steep tapers the longitudinal feed slows down in coordination with the outward or inward motion of the cross feed. Again the smoothness of finish required determines the feed settings.

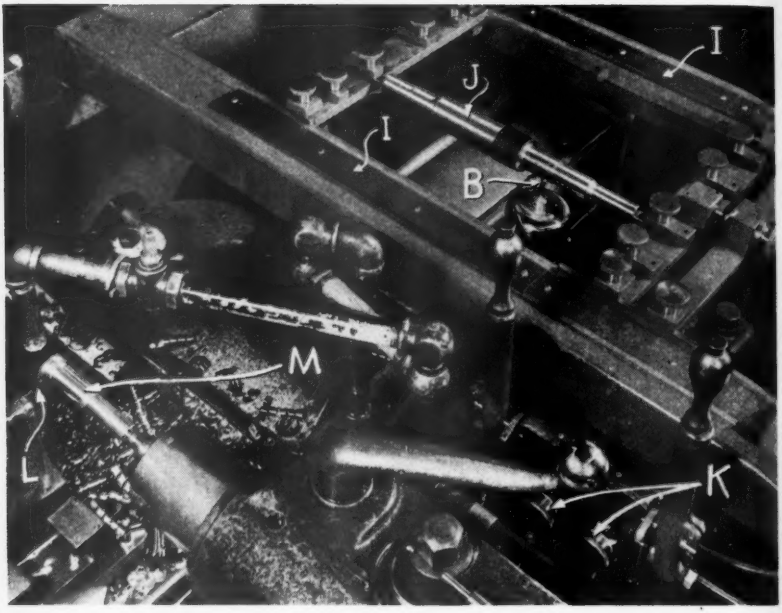
As will be noted from Figure 3 which shows typical step shafts and templets used at Reliance Electric & Engineering Company, any shapes which are practical to make can be duplicated as easily as simple shapes. Radii, recesses, tapers and square shoulders are all turned automatically.

Ample power to firmly drive and hold the cutting tool is provided by the large hydraulic cylinders so that the rate of feed and depth of cut are limited only by the lathe and cutting tools used. This installation is operated at cutting speeds of well over 300 surface feet per minute, longitudinal feeds up to .030" per revolution and cuts up to ⅜" in depth. Carbide cutting tools and coolant are used.

When it is necessary to take two cuts on the small diameter steps of a shaft, templets are equipped with hinged masks (H) as shown in Figure 3. An initial cut over the small diameters only is made with the hinged masks in a horizontal position. Then the tool is returned and the masks swung back as shown in Figure 3 for the final cut which is made over the entire length of the templet.

It will be noted from Figure 3 that the upper shaft is done in three operations while the lower one is done in two. All shafts in the lot are first machined on the right side only, using templet A. When the lot is completed a new setup is made using templet B and the shafts are placed in the lathe with the end machined by templet A at the headstock. The end corresponding to templet B is then machined on all shafts in the lot.

It will be noted from Figure 3 that a lip is provided at the end of each templet to back the tool away from the work when the cut is finished. At this point, the operator places the cross feed in neutral and the longitudinal feed in rapid



reverse which causes the carriage to automatically travel back to the starting position. Then the next piece of the lot is placed in the lathe and the operation repeated.

Templets are set up by clamping them in the support shown in Figure 4. This templet support provides straight edges (I, I) which are set exactly parallel with the lathe ways. Templets are set with their backs parallel to these straight edges.

Figure 4 shows the use of a master shaft (J) as a templet. As illustrated, this shaft is mounted on centers on the templet support and the tracer (B) follows the shaft instead of the usual thin metal templet. Note the corresponding positions of, respectively, the cutting tool (L) on the work (M) and the tracer point (B) on the master shaft (J). The master shaft method of duplicating is often used for short runs.

As would be expected from a machine of sturdy construction and with few moving parts, the availability of Contour Control on this installation has been almost 100%.

Many manufacturers are faced with the problem of economically manufacturing step shafts since these items are very common in mechanical design. Practically every rotating or oscillating part used in a wide variety of machines ranging from turbines to wrist watches moves on shafts of this type. In addition to the many step shafts used in motors, machine tools and gear boxes, many assorted pins and spacers are essentially shafts of this type.

We cannot stretch our paper, but . . . we can supply you with mighty helpful information in booklet form. These booklets, supplementing many of the valuable articles already published on our pages, are useful sources of information to have in your home reference or shop file. For a complete list of available booklets, see page 133.

Line Boring Fixture

by Alex S. Arnott

Pump castings designed to hold ball bearings at each end of the casting require a very accurate line boring operation to assure a proper line-up of the pump shaft and all the auxiliary equipment dependent on it for support. It is important that the diameters of the bores that hold the ball races be machined to exact dimensions and that they are in absolute alignment with each other to obtain a well balanced rotation of the pump equipment.

This type of machine shop operation usually requires special boring machine equipment in order to obtain the accuracy required by the product. However, in this case, where there was a small quantity of castings and no line boring equipment available, the line boring fixture shown in Figure 1 was designed with three objectives in mind:—

(1) To produce the small quantity of one hundred castings.

(2) To perform the boring operations as economically as possible and without the use of a boring machine.

(3) To avoid changing the setup of the work until all the line boring operations have been completed.

The product to be machined is shown in Figure 2, and is a pump body casting to be line bored through four different diameters, at a distance of 3.2475" from the base, to the depths shown from the ends of the casting. In a previous operation, the base and the 3.5" bore have been machined and these serve to locate the work for the line boring operation. The section A-A clearly shows the interior of the casting. On the end view of the illustration is shown the square end of the work which must also have machined its recess of 1.625" diameter. The line B-B indicates the surface which must be cleaned off in the operation.

Referring to Figure 1, there is illustrated the fixture, with an outline of the work indicated in broken lines to show its relative position during the operation, and one double blade boring bar.

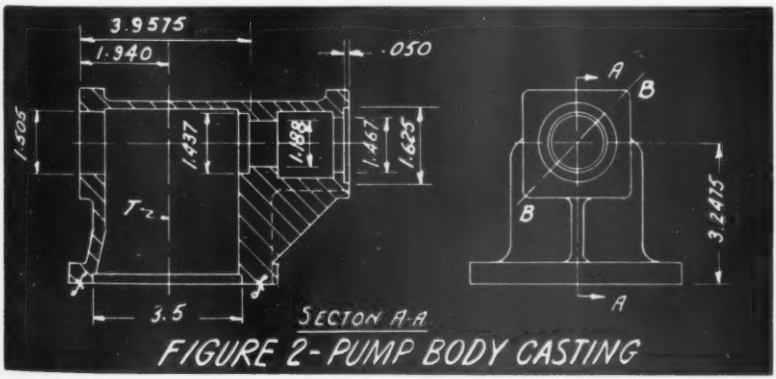


FIGURE 2- PUMP BODY CASTING

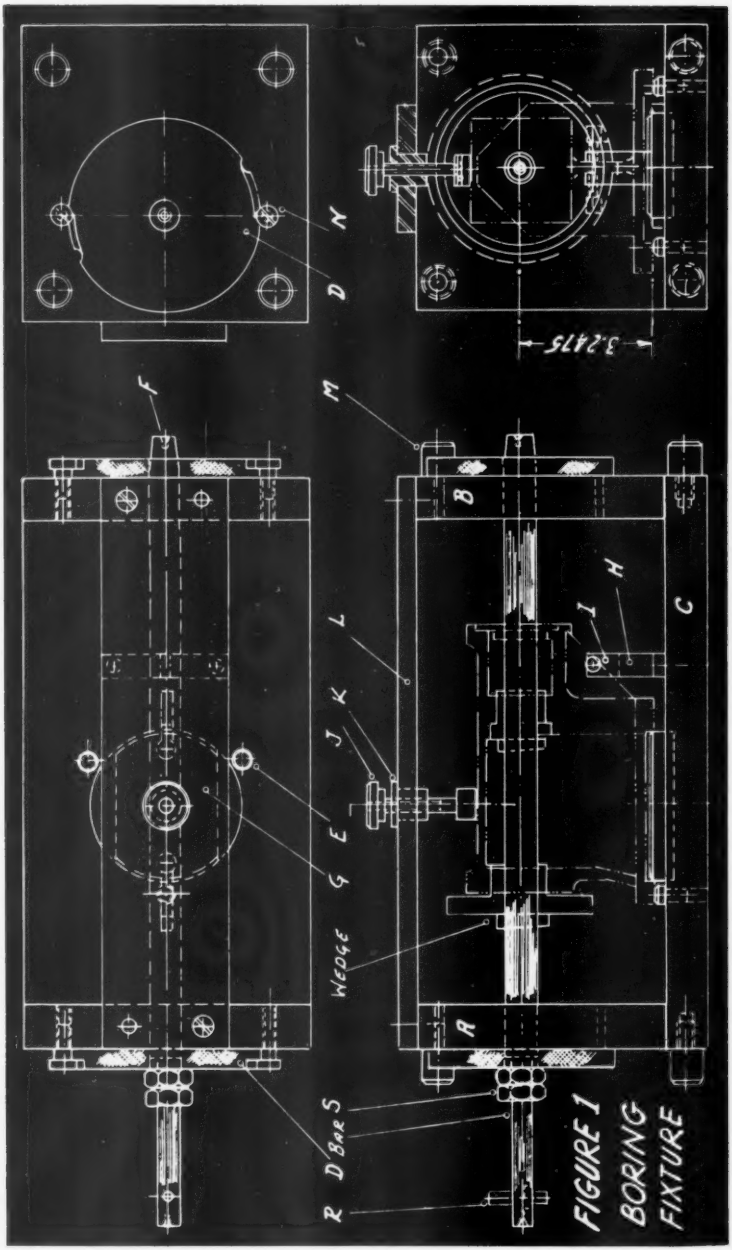


FIGURE 1
BORING
FIXTURE

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The construction of the fixture consists of a welded body made up of three pieces of machine steel, the two ends (A) and (B), and the base (C). The ends are accurately bored to accommodate the body diameters of the two special end bushings (D). Three resting pads (E) are inserted into the base and are ground parallel to each other in relation to the center line (F) to give the dimension 3.2475", the distance between the center line of the bores and the face of the base. These pads also serve to give proper balance to the work.

The spigot (G) is an accurately ground piece of tool steel and is made a snug fit for the 3.5" diameter bore in the work, and is inserted into a recess in the face of the fixture base, being held there firmly with two ⅜" cap screws. It is relieved on two sides and chamfered on the ends as shown in the top view, to allow the work to be inserted and removed without difficulty. In the front view of the illustration is shown a clearance between the top of the spigot and the work to allow the face of the casting to rest on the three pads (E).

A gage block (H) is fastened to the face of the base and its purpose is to locate the work centrally throughout its length by means of gaging from the 45° rib of the casting which is central with the center line A-A as shown on the end view of Figure 1. Feeler gages assist in locating the center and the work is held in position with the two set screws (I).

A hold down clamp (J) consists of a swivel pad attached to a threaded shaft which makes contact with the threaded bushing (K), after which the thumb screw is fastened to the shaft with a dowel pin to complete the assembly. The clamping arrangement is supported on the bar (L) by press fitting the bushing (K) into the bar and fastening it to both ends of the fixture body with screws and dowels.

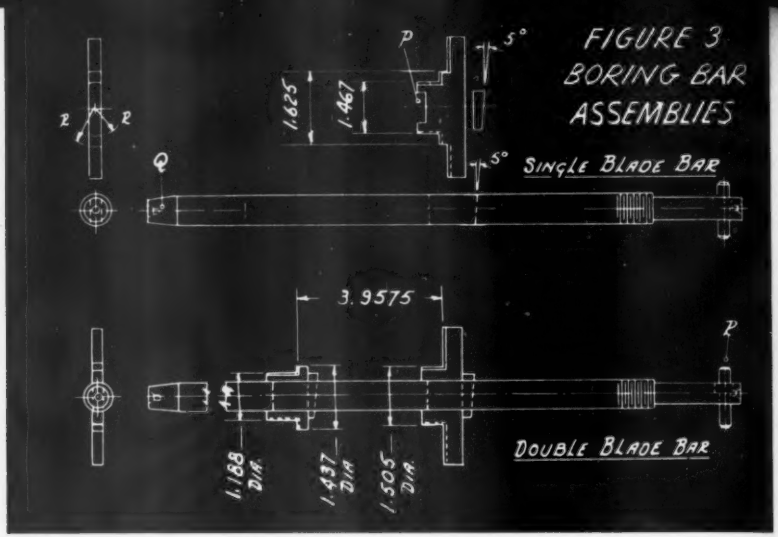
The four fixture feet (M) are inserted into each end of the body and are ground parallel to each other to allow the fixture to be set up on a machine table on either end for the boring operations. They are made sufficiently high to clear the heads of the special bushings (D).

The two end bushings are designed after the style of standard drill jig bushings with shoulder screws (N) to hold the bushing in place and the side groove milled to allow the bushings to be removed when necessary. The edges are knurled to assist the operator in turning the bushing by hand.

The fixture is equipped with two boring bars, one for each operation. Both bars are shown in Figure 3, the upper one being a single blade bar and the lower one a double blade bar. The double blade bar is shown assembled in position in the boring fixture, Figure 1. The body diameters of both bars are a close sliding fit into the bored holes of the bushings (D) and are free to slide in or out of the bushings. The ends are tapered to allow the bars to enter the holes with ease. The blades are held to the boring bars by machining slots through the bar to a slip fit for the width of the cutter blades and sufficiently long to allow the whole length of the blade to enter the slot with clearance for the holding wedges. As shown in the upper bar, the slot is milled at one end to an angle of 5°, the side of the wedges being milled to the same angle. All the blades are rough cut to size from high speed tool steel and are hardened, after which they are ground at (P) to the depth of ⅛". The blades are then placed into the slots in the bars and moved forward with the cuts (P) fitting snugly over the outside diameters of the bars. The holding wedges are then driven into position, with the angles of 5° serving to lock the blades firmly into position. The angle of the wedge and the bar should not be more than 8° in order to insure a positive locking effect.

When the bars are completely assembled, they are mounted on the centers (Q) at each end of the bar in a grinding machine, and the blades are finish ground to the diameters shown. The dimension 3.9575" is also determined during the setup. A thread is cut and a shoulder is machined at one end, after which a hole is drilled and counterbored to a loose fit for the driving pin (R). The end bushing is then slipped over the bar at the threaded end with two standard check nuts (S) threaded into place and the driving pin fitted into position.

In operation, the work is placed into the fixture from the open side with the 3.5" diameter bore of the casting fitted over the spigot and the face resting on



the three pads. The work is then lined up and clamped into position, the bushing at (B) is inserted into place, and the boring bar is passed through the large bore at (A). It will be observed that the purpose of such a large bushing is to allow the whole length of the cutting blades to pass through the bore in the end of the fixture without removing the blades from the boring bar. The tapered end of the bar is inserted into the bushing at end (B), the bushing at (A) is fitted into place, and the two check nuts threaded forward to limit the forward movement of the cutting blades. The nuts are adjustable to suit the 3.9575" depth of the bores and the 1.950" distance from the center line (T) to the end of the casting, Figure 2. The cutting operation for one end of the casting is then performed by turning the fixture up on the opposite end and inserting the driving pin into the chuck of the machine. As the machine turns the blades to cut the material, the bar is advanced until the check nuts come into contact with the surface of the end bushing when the cutting limit is reached. The boring bar assembly is then removed from the fixture.

To perform the second operation, the single blade boring bar is placed in position from the opposite end with two bushings as in the first operation, and the fixture is turned up as before. The same machining procedure is followed to complete the line boring operation, the work being held in the same location until both ends have been completely machined.

It was found in practice that the cutters were free from chatter due to the effective locking method of the wedges used in the boring bars, and that they did not need sharpening throughout the machining of the hundred castings.

by Donald J. Reese

Prospects for Principal Cast Metals—Part 2

To the best of my knowledge no one knows the dollar value of the products of the overall foundry industry. During 1944 it probably approached 3 to 3½ billion dollars. The industry employs approximately 400,000 to 450,000 people.

The following production was achieved in 1943 and 1944 for cast steel, gray iron, malleable iron, aluminum and magnesium.

Product	Products-Tons 1943	1944
Gray Iron	10,000,000	10,000,000
Steel	2,740,000	2,450,000
Malleable	850,000	900,000
Aluminum	230,000	258,000
*Magnesium	33,000	39,000

These figures are from published War Production Board data, except for minor adjustments of my own and some extrapolation from monthly production to an annual basis.

My position concerning engineering metals is limited to the desire that the most suited material be selected for every use and that the selection be made by one completely informed on all the materials that warrant consideration.

Others at this conference will discuss the properties of steel and of the white metals. Since mechanical properties of materials are approximately the same regardless of the process used in making them available, I would like to use the time at my disposal to discuss gray iron. Even during wartime, when many of its normal uses are drastically or completely curtailed, gray iron ranks as an engineering material second only to steel. When the steel industry reports production of 89.4 ingot tons, a comparable figure for gray iron at the same stage in manufacturing operations is 15 million tons. At the stage of assembly of these materials into finished machines, the comparison is more favorable to gray iron.

*Excludes incendiary bomb production

Gray iron is a generic term covering a whole family of ferrous alloys and there can be considerable dissimilarity between one gray iron and another. For instance, the tensile strength of one type of gray iron may be 20,000 pounds per square inch, while that of another may exceed 100,000 pounds. Gray iron is also an oddity in the family of metals in that its chemistry is designed in relation to the sectional dimensions of the part to be produced.

Let us assume that a 1" section is being computed for suitability, with a further assumption of a 30,000 psi ultimate strength and a factor of safety of 5, that is, with a unit stress of 6,000 psi, but the load is 12,000 pounds. Can the engineer double the section and still expect a material of 30,000 psi tensile? In most cases the same type of iron from any one source of supply would be used in making the 2" section as was used in making the 1" section, and the ultimate strength would be less than 30,000 psi, unless the specifications made it clear to the producer that design was based on 30,000 psi in 2" sections. To achieve this in the foundry, the chemistry of the iron would be designed for 2" sections instead of for 1" sections. A recommended method, however, would be to maintain the 1" section and specify a 60,000 psi iron.

When designing, the engineer avails himself of published data on the material and divides this data by his factor of safety (sometimes called the "ignorance factor"), which for gray iron is some number between 5 and 10. In addition to allowing a generous safety factor, the engineer also is reluctant to accept data on gray iron and uses the lower values of his reference. Much design utilizing gray iron is based on 25,000 psi ultimate strength which, with a safety factor of 10, results in a 2,500 psi unit stress. If the factor of safety were 2.5 instead of 10 and the quality of iron 60,000 psi in-

stead of 25,000, the unit stress for design might be 24,000 psi instead of 2,500, or about 10 times greater.

Currently, a nationally known pump and compressor manufacturer is subjecting gray iron parts to destructive testing; and on the testing done to date, failure occurs with a factor of safety of 1 at the previously determined ultimate strength, which, in this case, is approximately 40,000 psi. Currently, one of our nationally known Diesel engine manufacturers is producing the same size engine block in gray iron and in a welded steel fabrication. The finished weight of the gray iron block is about 10% less than the finished weight of the fabricated block. I believe that both blocks are intelligently designed for the specific methods of manufacture and for the materials of construction. The gray iron blocks have been tested to destruction by the engineers who were startled to learn that the stresses induced in destructive testing were many times the unit stresses used in design.

Unless weight is desired in the finished machine, gray iron presents a real challenge to the design engineer.

Some foundries have considerable "know how", while others have too little "know how"; and the problems concerned with quality are not of material but of a capable producer.

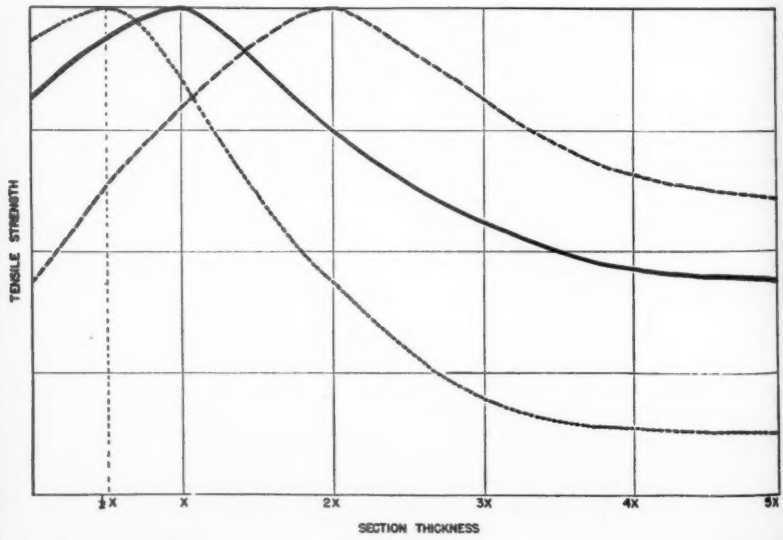
Strength-Weight Ratio

Gray iron weighs 7.3 grams per cubic centimeter or 0.26 pounds per cubic inch. The tensile strength per unit of area divided by the weight per unit of volume might range between 80,000 and something greater than 320,000. Not long ago manufacturers of gray iron piston rings for aircraft engines guaranteed their material at a minimum of 42,000 psi tensile. Currently they are guaranteeing a minimum of 90,000 psi. Average performance must be somewhat better than the guaranteed minimum and the strength-weight ratio in this case approaches 400,000.

Ductility

The engineer wants data on "elongation" and "reduction in area" even though these data are not used in design calculations. Usually the numerical values required for this abstract data greatly

CURVES TO ILLUSTRATE CHEMISTRY ADJUSTMENT FOR CONSTANT QUALITY WITH VARYING SECTION



exceed the maximum use of these properties in a machine under any condition of use or abuse. Gray iron has been considered a brittle material, yet it has a measurable, though small, elongation of the order of 1%.

Gray iron is considered to have only slight resistance to impact. Up to the present time no standard test method has been adopted so that impact data for gray iron may be compared with other materials. However, considerable impact testing is done on this material by drop testing, repeated drop testing, and modifications of Charpy and Izod methods. For instance a 1.125" diameter, machined bar, broken on 6" centers, may show an impact resistance of 20 to more than 120 foot-pounds for the various types of gray irons.

Young's Modulus of Elasticity

This value for steel, generally taken as 28,000,000 to 30,000,000, may range from 12,000,000 in one type of gray iron to more than 20,000,000 in another type. We expect Young's modulus of elasticity to be constant for a homogeneous material but gray iron is a heterogeneous material and Young's modulus will vary with heterogeneous variations of the material.

Fatigue Life or Endurance Limit

Many thousands of tons of gray iron crankshafts have been used in large internal combustion engines and in other reciprocating machinery within the past five years. The endurance limit of gray iron should be parallel to the tensile strength at a point close to 0.45 times the tensile strength. Design of these parts is based on a minimum endurance limit of 25,000 psi. Some gray iron crankshafts weigh 5 tons and are 22 feet long. One company that has made thousands of crankshafts for one particular service has been informed of only two failures and these were not associated with the material.

Damping

Years ago the lever mechanisms and understructures of scale mechanisms were gray iron parts but today the 200 and 250 ton scales used in heavy industry and for railroad car weighing have steel levers and mechanisms. Vibration is transmitted through the whole structure to the hardened 52100 steel knife edges, vibration enough to shift position of the knife edges and inject weighing errors. The damping property of gray iron would destroy vibration before it could reach the knife edges. Design of scale mechanisms must conform to specifications laid down by one of our national code making bodies (American Association of Railways) and sometime in their history they required either material properties beyond what engineers could find in their obsolete references on gray iron, or their foundry sources were not aggressive in improving quality levels of the material compatible with increasing requirements. Transmission machinery, particularly gearing, is another application of gray iron where its damping property is of value in decreasing the noise level.

Gray Iron at Elevated Temperatures

Many years ago one of our national code making bodies (Boiler Code Committee, A.S.M.E.) determined that gray iron should not be used at temperatures beyond 450° F in pressure-temperature applications. Within the past year this limitation has been increased to 650° F.

Metallurgy

Those of us associated with the metallurgical profession know that such terms as ferrite, pearlite, aricular, martensite, austenite and carbide are used to describe the matrix of various types of steel which would include structural, manganese steel, tool steel, stainless, etc. All of these metallurgical terms are equally applicable and correctly applied to the many types of gray iron.

Development

Many large foundries have well equipped research facilities directed toward producing increased quality in the material and toward making better component parts of the material. The research facilities of other organizations implement the foundry facilities. Within the past year the Board of Directors of the Gray Iron Founders' Society established cash awards for research work done in engineering schools throughout the country. An essential of this work is that all data developed be in measurable units that the engineer uses with other materials.

Molded Plastics Bullets*

by J. H. DuBois
Executive Engineer
SHAW INSULATOR COMPANY
Author "*Plastics*"

A new plastics compound is used for the molding of a training bullet for the A. A. F. This has been called a frangible (breakable) bullet. It is a cal. .30 machine gun slug which may be fired through conventional machine guns at specially armored planes to simulate actual fighting conditions. This bullet is hard enough to penetrate a 4" x 4" block of wood but disintegrates completely when it strikes the special duraluminum plane armor.

This new development permits the training of gunners under actual flight conditions. The armored target planes are also equipped with radiosonic apparatus so that each hit is indicated by means of a lamp in front of the gunner permitting him to correct his aim until hits are registered. Under previous systems, the gunners aimed at towed targets and only learned of their accuracy after a return to the ground.

*Cleared by the Office of Chief of Ordnance, U. S. Army.

This very successful practice bullet was conceived by Major Cameron Fairchild and the original development work was carried out by Bakelite Corporation working with Duke University.

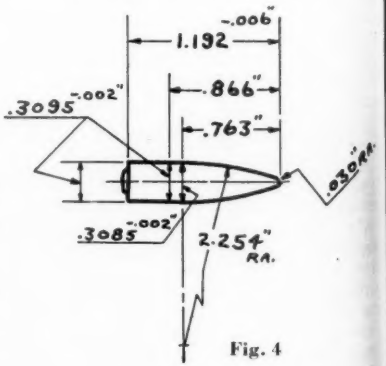


Fig. 4

A representative group of molders have collaborated in the molding of the frangible bullet. The Integration Committee Meetings have served to provide a quick exchange of engineering experience and to solve the large number of production problems. A tremendous amount of work was done to put this project into large scale production in the few weeks that were available.

The molders contributing to this development are:
Boonton Molding Co. ....Boonton, N. J.
Compression Molding Co..St. Louis, Mo.

Consolidated Molded Products Co. ..... Scranton, Pa.
The Grigoleit Co. .....Decatur, Illinois
Industrial Molded Products Co..... Chicago, Ill.
Mack Molding Co. .....Wayne, N. J.
Molded Products Co. .....Chicago, Ill.
Minneapolis Plastic Molders, Inc. ..... Minneapolis, Minn.
Plastics Engineering Co. ..... Sheboygan, Wis.
Shaw Insulator Co. ....Irvington, N. J.
Universal Plastics Corp. ..... New Brunswick, N. J.
Waterbury Companies, Inc. ..... Waterbury, Conn.
The Woodruff Co. .....Auburn, N. Y.

Mold Cavities and complete molds were built by:

Midland Die & Engraving Co..... Chicago, Ill.
The Newark Die Company ..... Newark, N. J.
Pal Tool Company ..Minneapolis, Minn.
Western Cartridge Co. ..East Alton, Ill.

The molding compound, developed by Bakelite Corporation, has very high density. It can be molded easily by compression or transfer and is a fast flowing compound. Unlike all other thermosetting materials, it has high thermal conductivity, minimizing the necessity for or the desirability of preheating. Under high frequency, the filler heats quickly and flows freely from the preform. It was found desirable to use infra-red preheating in the winter when the preforms were excessivly cold. The use of very cold preforms resulted in weak tips caused by the flow of poorly heat-plasticized compound. In normal operation, best results were obtained by storing and using the preforms at room temperature with no preheating.

The molding cycle consists of a careful and thorough mold cleaning operation, loading the preforms in the chamber and then closing for a short period to heat-plasticize the compound in the transfer chamber before the final high pressure is applied. A cure time of 80 seconds is used. The high thermal conductivity of the compound contributes to the fast rate of cure. Some of the

Fig. 1—These frangible bullets have just been pulled out of the mold cavities and are held against the sprue plate until the sprues are broken.

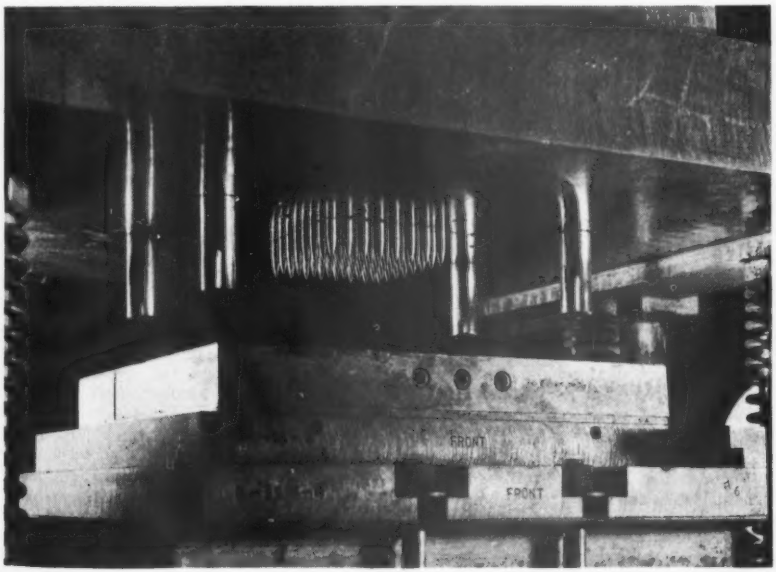


Fig. 2—This special impact testing machine was developed to record the relative strength of the plastic bullets.

molders are using bulk compound to eliminate the preforming operation.

The bullets are pulled out of the cavity by the sprues, Fig. 1, and the press operator catches them as the continued opening of the mold breaks the sprue at the navel of the bullet. This mold design permits the molding of pieces without the use of knockout pins. The bullets are examined by the press operator after each cycle for obvious defects and to make sure that production is stopped when the mold operation is unsatisfactory.

No finishing is done by the molders since the gate end is removed by the cartridge manufacturer when he cuts the crimping groove and end radius. Some of the molders are pushing the bullets through a sizing die to produce uniform outside diameter.

A sub-cavity gang mold would be the logical first choice in considering a mold design for the bullet. Several types of compression molds were tried by Bakelite Corporation and by the various molders in making the preliminary studies of the molding problem. These molds, however, produced weak bullets having low strength characteristics perpendicular to the axis. Additional study indicated that the weakness resulted from stratification during molding.

Transfer molding was then tried and satisfactory results were obtained immediately. Whereas the compression molded bullets would break at the low angle of 35°, the transfer molded bullets would average 75° on the special impact testing machine shown in Fig. 2, and used for testing the bullets. A study of Fig. 3 will show the orientation factor resulting from the transfer molding process that provided the increased strength. It will be noted that the entering ribbon of compound is stopped at the bottom of the cavity and then winds up in spiral form to fill the cavity. When it is filled, the pressure blends the spirals into a uniform mass. This orientation of the entering compound provides the added strength characteristics. Another gain resulting from this molding process is the venting which takes place along the spirals as the bullet is being formed; thus the molded bullet has no entrapped air-voids near the tip. Each cavity is vented to the outside by a channel in the sprue plate.

The transfer mold design ultimately selected by Shaw engineers resulted from consideration of many variables and fundamental problems. The specifications called for unheard of low dimensional variables, Fig. 4, nearly absolute control of density and, finally, perfection in surface texture. It was obvious that the mold design must preclude the possibility of making bad bullets. To accomplish this, the cavities were made as individual units that could be clamped into the mold shoe. This arrangement permitted the immediate replacement of cavities that produced bad bullets. When replacement cavities were not available, the defective cavity was merely turned upside down so that no part was produced.

The mold, Fig. 5, was designed with removable sprue plates so that changes could be made as the need developed. This permitted a reduction in the sprue plate thickness as experience indicated that it was safe to do so. The initial ¾" length of sprue indicated by the first sample mold was ultimately cut down to $\frac{7}{16}$" in length and this introduced an important saving in compound. The transfer chamber was designed to enclose the outer rows of sprues. It will be

Fig. 5—Final design features of transfer mold for frangible bullet production.

Fig. 3—The steps in the forming of the bullets are shown at the left. Noteworthy is the spiral effect that takes place as the entering ribbon of compound coils up into the cavity thus greatly increasing the strength of the bullets.

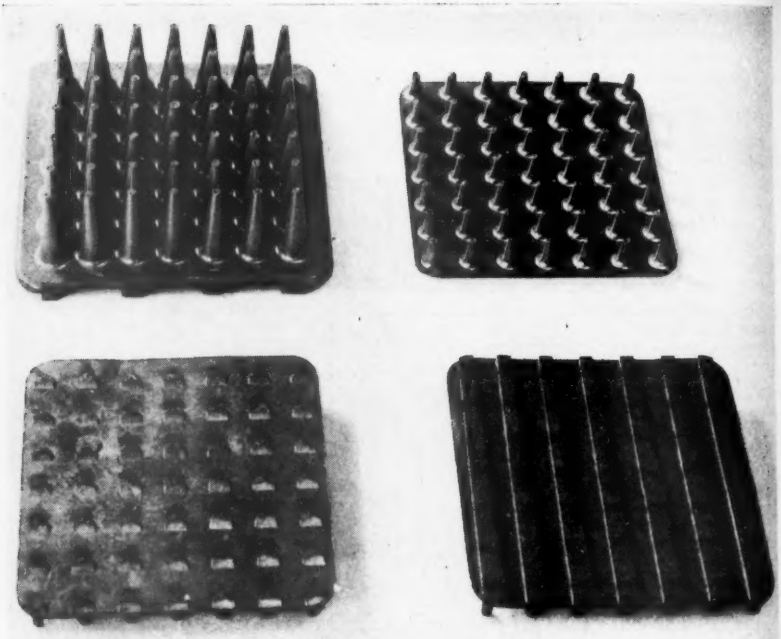


Fig. 6—Various types of sprues and sprue pullers were tried in the development of these molds. The original sprues, upper left, were reduced in size to that shown in upper right. The wedge-shaped sprue pullers, lower right, were replaced by the individual sprue hooks shown in lower left.

noted that the mold is not latched and springs are used to raise the chamber as the press rises.

A variety of sprue pullers were sampled to find the method that would provide maximum economy. It was thought that some gain might be experienced from the long wedge-type sprue pullers, Fig. 6, over each row of sprues since this also served as a runner in the transfer chamber over the sprues to equalize flow and facilitate the formation of a thin cull. Maximum material economy resulted from the individual sprue pullers shown in Fig. 6 and a molding cycle was developed so that the desired thin cull was also obtained with this design.

The original mold design selected represents considerable foresight because it permitted a gradual change as refinements developed without any major alteration or loss. For example, the original 49 cavity mold was converted to a 64 cavity mold, merely by grinding down the size of the cavity blocks, and adding one row of cavities on each side. A new sprue plate completed the change since the transfer chamber and plunger continued to serve the same mold area. This change decreased the cull loss considerably and was accomplished with a minimum of shut-down time.

This flexible mold design considerably reduces the inspection problem and permits the holding of scrap loss to a minimum. Length control is exercised by accurately grinding the individual cavity blocks. The outside diameter was found to vary with mold temperature, molding time, molding pressure and the mold dimension. Since the mold cavities are easily replaced, those producing oversize or marginal bullets are removed as they are found. In like manner,

scratched or otherwise damaged cavities are pulled out as they show up during the rig'd routing inspection at the press.

Careful control of the mechanical variables and precision timing of cycles helped reduce the visual defects to a minimum. Air operated diaphram valves and fast press travel speeds, enable the operator to obtain a high output per press.

The T-44 bullets production program has established a new high standard of performance by the molders. It has been found possible to achieve quality control previously considered impossible. Much new fundamental experience in the art of molding has resulted from this project. The "heavy" compound opens up other new markets for the molded plastics. Many new and important industrial products may result from this new plastics compound which may be used for items having controlled weight or high inertia characteristics.

*

New Plastic Preheating Ovens

Despatch Plastic Preheating Ovens, now made in standard sizes of six, eight, ten, and twelve drawers, are described and illustrated in three new Bulletins issued by Despatch Oven Company, 619 S.E. Eighth St., Minneapolis 14, Minnesota. In the Despatch convection heating system, the air is fan-driven through heat ducts and forced to flow horizontally through the chamber. Recirculating ducts conduct the air to the heating chamber to complete the convection cycle. The press operator can determine his own rate of production and use the number of drawers required for each change of preform in sizes, shape or quantity.

The high volume fan in the oven gives extra-fast airflow, while the heat-ports assure very close control of heated airflow through the chamber. Because this oven has a very uniform airflow, the temperature within the working chamber is accurate to plus or minus 1° C.

Plastics that were formerly preheated at temperatures of 150 to 160° or at 190 to 200° are now being preheated at temperatures as high as 300 and 325°. Despatch Plastic Preheating Ovens are set for a maximum temperature of 350° F.

A New One-Piece Fastener Assembly

The Spring Lock Fastener, a new one-piece fastener assembly, which does not require nuts or receptacles, has been developed by the Simmons Fastener Division of the Simmons Machine Tool Corporation, Albany 1, N. Y. This new development is expected to make a simple process of blind fastening. An important

feature of the Simmons Spring Lock Fastener is that it eliminates the need of lock washers and will not work loose.

The accompanying photograph illustrates the inexpensive, single-piece construction of the fastener. It is self-adjusting to compensate for various material thicknesses within the range of the fastener. It locks and unlocks with a quarter-turn in a 90° clockwise rotation or can be permanently installed for use as a blind rivet. One-direction rotation for locking or unlocking is assured by the unique construction of the head. A quarter- turn puts the initial twist in the spring and another quarter-turn locks the fastener in place. Spring pressure pulls the sheets together providing a tight, vibration proof installation and high initial load without deflection.

It is claimed by the manufacturer that the new Spring Lock Fastener can be used at a fraction of the cost of other fastening methods because of its low unit cost and simple installation.

Estimate Of A Six Cavity Stripper Plate Injection Mold*

Prize Winning Estimate by John Wintemute

EDITOR'S NOTE

This estimate follows the method of predetermining mold costs as outlined by Mr. Thayer in his series of articles on "Estimating Plastics Molds" published in the August to December 1944 TDJ. This series has been reprinted as Number 3 of the Tool & Die Journal Know-How Library. Copies of "Estimating Plastics Molds" are available from the Know-How Library Editor, Tool & Die Journal, at 35 cents per copy, postpaid.

(1) EJECTOR ROD C.R.S. 1 Req'd

Cut off stock	.1
(set up)	.1
Turn dia. & sq. ends	2.0
(set up)	.1
Total hrs.	2.3

(2) REAR ADAPTER PLATE—1½" x 10" x 12"—C.R.S. 1 Req'd

Cut off stock	.4
(set up)	.1
Sq. (2) sides	.5
(set up)	.1
Layout	
Ejector Rod	.2
Clamp grooves	.4
Assy. screws (4)	.5
Assy. screws (6)	.5
Turn Locating Boss (4 dia.)	.7
Drill & Ream for Ejector Rod	.2
Mill Clamp Slots (2)	2.3
Tap (4) Holes for Assy. Screws ½-13 x ¾" deep	.4
Drill & C'Bore for ½" Soc. Hd. Screw	.4
Total hrs.	6.7

(3) STD. SCREWS

(4) EJECTOR BOX SPACER 2" x 2" x 10" —C.R.S. 2 Req'd

Cut off stock	.1
(set up)	.1
Sq. (2) ends	.2
(set up)	.1
Layout screw holes (4)	.3
Drill & C'Bore for ½-13 Soc. Hd. Screw (4)	.4
(set up)	.1
Total hrs.	1.3

(5) EJECTOR PIN ⅜" Dia. x 6" Lg. Drill Rod 4 Req'd

Cut off stock	.1
(set up)	.1
Peen end	.2
Face both ends to length	.2
Harden	.2
Clean up & fit after hardening	.1
Total hrs.	1.0

(6) ASSY. SCREWS, standard, in stock (4 Req'd)

(7) STRIPPER BOLT—standard, in stock (4 Req'd)

(8) CAVITY RETAINER PLATE 1½" x 10"

(9)

(10)

**This estimate was awarded First Prize in the Mold Estimating Contest announced in the January issue. Mr. Wintemute wins a $25.00 War Savings Bond with this excellent estimate.*

Condensed Estimate of Six Cavity Mold for Cigarette Box Cover

DET.		HRS.
1	*Ejector Rod*	2.3
2	*Rear Adapter Plate* ..	6.7
4	*Ejector Box Spacer* .....2 @ 1.3	2.6
5	*Ejector Pin* ...4 @ 1.0	4.0
8	*Cavity Ret. Plate*	48.7
10	*Cavity Backing Plate* .	6.15
16	*Eject. Pin Ret. Plate* .	3.5
17	*Core Backing Plate* ...	4.3
18	*Core Ret. Plate*	23.1
19	*Stripper Plate*	33.4
20	*Guide Pin* ....4 @ 2.5	10.0
21	*Sprue Bushing*	3.9
24	*Return Pin* ...4 @ 1.6	6.4
25	*Ejector Pin Assy. Plate*	3.0
27	*Sprue Eject. Pin*	.8
28	*Core Block* ....6 @ 7.0	42.0
29	*Guide Pin Bushing* .....4 @ 3.5	14.0
30	*Cavity Blocks*..6 @ 20.4	122.4
	Total	337.25

Does not include assembly time and cost of standard screws.

x 12" C.R.S.—1 Req'd

Cut off stock	.3
(set up)	.1
Sq. (2) Sides	.4
(set up)	.1

Layout

Core Ret. Pockets (6) .....(2.4 + Insp.)=5.3	
Guide Bush'g Holes (4) .....(.4 + Insp.)=1.3	
Sprue Bushing Hole	.2
Fastening Screws (6)	.5
Water Lines (5)	1.1

Machine

Mill Core Retainer Pockets (6) .....(+ 50% Tol.)	32.4
(set up)	.4
Drill & Ream Bush'g Holes (4)	1.6
Drill & Ream Sprue Bush'g Hole	.2
Drill & Tap for Fastening Screws (6 Holes)	.6
Drill water lines (5)	3.0
(set up)	.4
Tap for Plugs & Pipe	.8
Total hrs. 48.7	

(9) STD. ½-13 SCREW (6 Req'd)

(10) CAVITY BACKING PLATE 2" x 10" x 12" C.R.S. 1 Req'd

Cut off stock	.3
(set up)	.1
Sq. (2) sides	.5
(set up)	.1

Layout

Center lines for loc. boss & sprue bush'g (2)	.2
Fastening screws (6)	.5
Clamp Grooves (2)	.6

Machine

Turn loc. Boss	.65
(set up)	.1
Bore Sprue Bush'g Hole	.4
Mill 2 Clamp Grooves	2.0
(set up)	.1
Drill & C'Bore for 6 Mounting Screws, ½" Dia.	.6
Total hrs.	6.15

(11) Loc Boss (Stationary)

(12) WATER LINE

(13) PIPE TAP

(14) Should be (1) (Misprint)

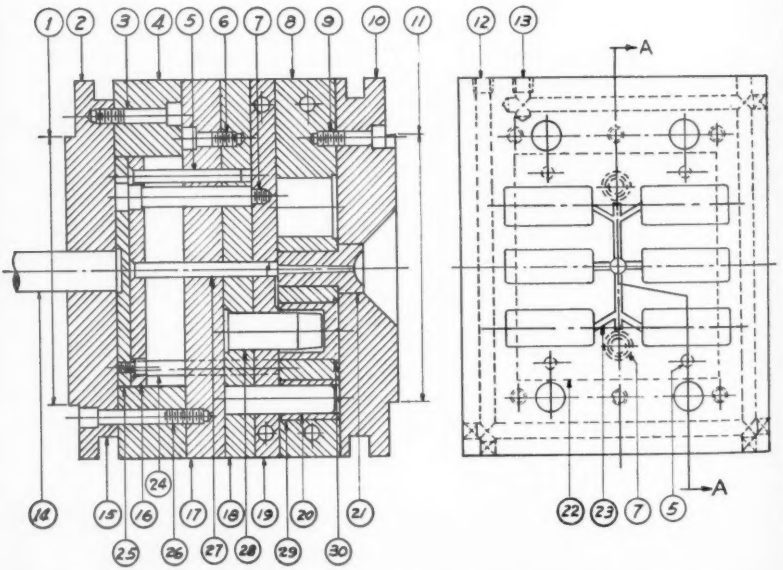
(15) CLAMP SLOT

(16) EJECTOR PIN RET. PLATE ½" x 8" x 10" C.R.S. 1 Req'd

Cut off stock	.3
(set up)	.1
Sq. 2 sides	.3
(set up)	.1

BILL OF MATERIALS

Detail Number	Part Name	Stock Size	Material	Number Required
30	Cavity Block	1¾" x 2¾" x 1½" long	Alloy Mold Steel Hardened	6
28	Core Block	1" x 2¼" x 3" long	Alloy Mold Steel Hardened	6
8	Cavity Retainer Plate	1½" x 10" x 12" long	C.R.S.	1
18	Core Retainer Plate	1¼" x 10" x 12" long	C.R.S.	1
10	Cavity Backing Plate	2" x 10" x 12" long	C.R.S.	1
17	Core Backing Plate	2" x 10" x 12" long	C.R.S.	1
19	Stripper Plate	¾" x 10" x 12" long	Alloy Mold Steel Hardened	1
4	Ejector Box Spacer	2" x 2" x 10" long	C.R.S.	2
2	Rear Adaptor Plate	1½" x 10" x 12" long	C.R.S.	1
16	Ejector Pin Ret. Plate	½" x 8" x 10" long	C.R.S.	1
25	Ejector Pin Assm. Plate	¾" x 8" x 10" long	C.R.S.	1
27	Sprue Eject. Pin	⅜" dia. x 6" long	Drill Rod	1
5	Ejector Pin	⅜" dia. x 6" long	Drill Rod	4
24	Return Pin	⅜" dia. x 6" long	Drill Rod	4
1	Ejector Rod	1" dia. x 8" long	C.R.S.	1
20	Guide Pin	1" dia. x 3½" long	Tool Steel Hardened	4
29	Guide Pin Bushing	1¼" dia. x 1½" long	Tool Steel Hardened	4
21	Sprue Bushing	1½" dia. x 2¼" long	Tool Steel Hardened	1
7	Stripper Bolt	½" dia. x ⅜" Thread		4
9	Assm. Screw	½" dia.		6
6	Assm. Screw	½" dia.		4
3	Assm. Screw	½" dia.		4



Two views of the box cover mold—one facing the ejection half, the other a sectional elevation. The compact six cavity stripper-plate design is adapted to short cycle high production runs.

Layout

Sprue Puller hole 2
Ejector Pins (4) 4
Return Pins (4) 4
Stripper bolts (4) 4

Machine

Drill & C-Sink for Sprue puller (1) 1
Drill & C'Sink for Ejector Pins (4) 4
Drill for Return Pins (4) .. .4
Drill for Stripper bolt (4) .. .4

Total hrs. 3.5

(17) CORE BACKING PLATE 2" x 10" x 12" C.R.S. 1 Req'd

Cut off stock 3
(set up) .1
sq. (2) ends 5
(set up) .1

Layout

Sprue puller hole (1) 1
Eject. Pins Holes (4) 4
Return Pins (4) 4
Ass'y Screws (6) 6
Stripper Bolts (4) 4

Machine

Drill, ream for sprue puller pin (1) ⅜" Dia. (+ 200%) .3
(set up) .1
Drill, ream for eject. pin holes (4) ⅜" Dia. ...(+ 200%) .3
Drill, ream for return pins (4) ⅜" Dia. ...(+ 200%) .3
Tap ½"-13 x ¾" deep (4) 1
Drill & C'Bore for ½" Soc. hd. scr. (4) 3

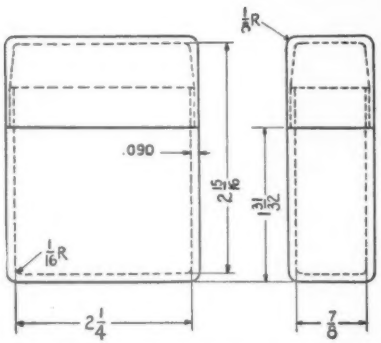
Total hrs. 4.3

(18) CORE RETAINER PLATE 1¼" x 10" x 12" C.R.S. 1 Req'd

Cut off stock 3
(set up) .1
Sq. (2) sides 5
(set up) .1

Layout

Core pockets (6) ....(includes insp.) 7.8
Guide pins (4) ..(inc. insp.) 1.3
Ejector pins (4) 4
Sprue puller (1) 2
Return pins (4) 4
Assy. Screws (4) 4
Stripper bolts 4



The side and end elevation views of the cigarette box are shown. The cover of the box is the part molded.

Machine

Mill Core Pockets (6) ....(inc. tol. allowance) 9.0
Drill & Ream for Eject. Pins (4) 4
Drill & Ream for Guide Pins (4) 8
Drill & Ream for Sprue Puller (1) 1
Drill for Stripper bolts (4) .. .4
Tap for Assy. Screws ½-13 (4) 4
(set up) .1

Total hrs. 23.1

(19) STRIPPER PLATE ¾" x 10" x 12" Alloy Mold Steel, 1 Req'd

Cut off stock 3
(set up) .1
Sq. (6) Surfaces 2.8
(set up) .1

Layout

Core pockets (6) 7.8
Guide Pins (4) 1.3
Ejector Pins (4) 4
Return Pins (4) 4
Sprue Puller (1) 2
Stripper Bolt (4) 4
Water Lines 9

Machine

Mill Core Pockets (Tol. Inc.) 11.7
Drill & Ream for Guide Pins (4) 8
Drill & Ream for Eject. Pin (4) 4
Drill & Ream for Return Pins (4) 4

Dr ll & Ream for Sprue Puller (1) 1
Tap for Stripper Bolt ⅜" Thd. (4) 4
(set up) .1
Drill Water Lines ⅜" Dia. x 44 in. 3.5
(set up) .4
Harden 9

Total hrs. 33.4

(20) GUIDE PIN 1" Dia. x 3½" LG T.S.H. 4 Req'd
Cut off stock 1
(set up) .1
Turn & Face Ends 1.0
(set up) .1
Harden 1
Grind 1.0
(set up) .1

Total hrs. 2.5

(21) SPRUE BUSH'G 1½" Dia. x 2¼" LG T.S.H. 1 Req'd
Cut off Stock 1
(set up) .1
Turn & Face 1.2
Spher. Sprue Nozzle 4
Drill & Ream 1
Tapered Hole (Taper Ream) .1
Harden 2
Grind 1.2
Polish Sprue Hole 5

Total hrs. 3.9

(22) RUNNER

(23) RETURN PIN ⅜" Dia. x 6" LG Drill Rod 6 Req'd
Cut off stock 1
Turn Thd. dia. & Face Ends .6
(set up) .1
Thd. ¼-20 2
Harden 3
Polish and fit 3

Total hrs. 1.6

(24) EJECTOR PIN ASSY. PLATE ¾" x 8" x 10" C.R.S. 1 Req'd
Cut off stock 3
Sq. ends (2) 3
(set up) .1
Layout
Stripper bolts 4
(set up) .1
Tapped Holes for 4
Return Pins 4
Machine
Drill & Tap for Return Pins (4) 4
Drill for Hd. of Stripper Bolts (4) 4
C'Bore 1⅛" Dia. x ⅛" Deep . .2

Total hrs. 3.0

(25) ASSY. SCREWS

(26) SPRUE EJECTOR PIN ⅜" Dia. x 6 LG. Drill Rod 1 Req'd
Cut off stock 1
Peen end 2
Face both ends to length 2
Harden 2
Clean up & fit after harden ng 1

Total hrs. 8

(27) CORE BLOCK 1" x 2¼" x 3" Alloy mold steel—Harden—6 req'd
Cut off stock 1
(set up) .1
Sq. S des 4
(set up) .2
Mill Shld'r 4
(set up) .4
Mill Angle 4
(set up) .5
Harden 5
Grind 3.0
Polish Mld'g Portion 1.0

Total hrs. 7.0

(28) GUIDE PIN BUSH'G 1¼" Dia. x 1½" LG. T.S.H. 4 req'd
Cut off stock 1
Turn & Face Ends 8
Bore 8
Harden 2
Grind Inside & Out 1.6

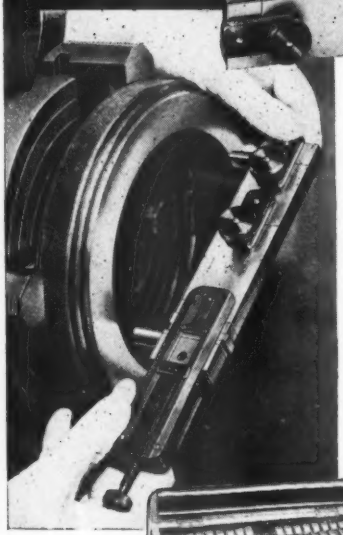
Total hrs. 3.5

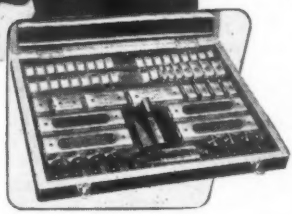
(29) CAVITY BLOCKS 1¼" x 2¾" x 1½" Alloy Mold Steel—Hard 6 Req'd
Cut off Stock 1
Sq. Sides (inc. shld'r & set up) 1.2
Layout Cavity 9
Mill Cavity 5.0
Harden 2
Grind—inside & out 8.0
Polish 5.0

Total hrs. 20.4

WEBBER *heavy duty* GAGE BLOCKS

are practical, precision working tools





● For example, we show how Webber heavy duty gage blocks can be assembled easily and quickly into a positive accurate inside or outside caliper.

The inside flat surfaces of the jaws permit the quick checking of inside micrometers and pin gages or this setup can be used as a temporary snap gage. The ½" radius outside surface of the jaws permits the direct checking of all inside dimensions. A typical example is the ring gage illustrated which is being checked for size while still mounted in an internal grinder. There is no chance for error and you can work to limits in millionths of an inch.

This is only one of the numerous uses for Webber Heavy Duty Gage Blocks and puts gage block precision to work in the shop.

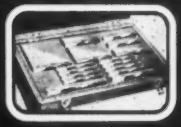
Note in particular the simplicity of the set. There are no loose pins, nuts, or screws to look for in assembling blocks. The entire set is self contained and provides measuring tools in a range from .300" to 24.000" or 36.000" and by the addition of extra 6.000" blocks up to 100 inches or more. In building up any measuring tool with these blocks —unique eccentric clamps are used to hold the blocks together. A quick acting clamp is used to firmly hold blocks of less than 1.000" in position.

It is only a matter of seconds to build up an accurate he ght gage—an inside or outside caliper or a divider.

Investigate the Webber Heavy Duty Gage Set for making precision measurements and for speeding up the operation of measuring.

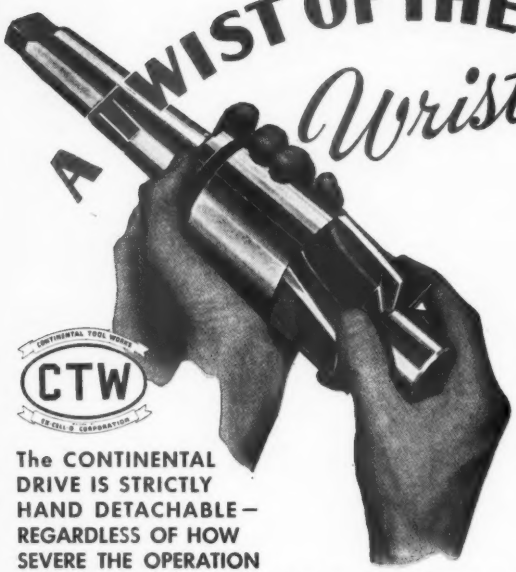
Set No. H.D. 24
Range from .300" to 24.000" in steps of .0001" .. $385.00

Set No. H.D. 36
Range from .300" to 36.000" in steps of .0001" .. $450.00



Webber GAGE COMPANY
12903 TRISKETT RD. • CLEVELAND 11, OHIO

A TWIST OF THE *Wrist*



CONTINENTAL TOOL WORKS
CTW
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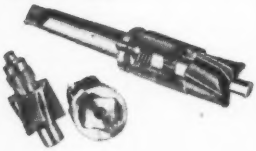
The CONTINENTAL DRIVE IS STRICTLY HAND DETACHABLE—REGARDLESS OF HOW SEVERE THE OPERATION HAS BEEN



With an ever-widening range of practical uses, the Continental Counterbore is proving a favorite standard cutting tool in all types and sizes of machine shops. Of rigid and simple construction, with patented features, it has long been outstanding in American industry. There's a reason: Note in illustration at left the Continental indestructible drive. It is composed of two driving lugs formed on the cutter shank, with two corresponding abutments on the inside of the holder. There is an aligning bearing above and below the driving lugs that brings the cutter and holder concentric, and prevents the cutter from being forced out of alignment. The cutter and holder are engaged and disengaged by revolving the cutter a quarter turn by hand. No tools or equipment are necessary.

CONTINENTAL TOOL WORKS
Division of Ex-Cell-O Corporation
DETROIT 6, MICHIGAN

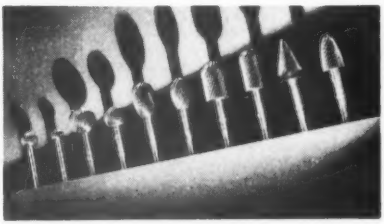
Continental
CUTTING TOOLS

- Boring Bars and Tools
- Broaches
- Broach Pullers
- Broaching Fixtures
- Core Drills
- Counterbores and Countersinks
- CTW Drive Holders
- Counterbores (Tool Room Sets)
- Counterbore Pilots
- Inserted Blade Cutters
- Carbide Tipped Cutters
- Form Relieved Cutters
- Milling Cutters
- Thread Milling Cutters
- End Mills
- Side Mills
- High Speed Steel Reamers
- Carbide Tipped Reamers
- Shell Reamers
- Inverted Spotfacers
- High Speed Steel Tool Bits
- Carbide Tipped Tool Bits
- Circular Form Tools
- Cut-off Tools
- Flat Form Tools
- Dovetail Form Tools

45-47

PROGRESS ON PARADE

CARBIDE AND HS STEEL CUTTERS. M. A. Ford Mfg. Co., Inc., have supplemented their line of ground steel cutters with a complete stock of carbide cutters. Ford carbide cutters are ground from solid cemented tungsten carbide blanks and offer the advantages of faster cutting speeds, greatly increased tool life with proportionately fewer sharpenings, lower tool inventory and maximum production economy. Ford ground steel cutters are designed primarily for use with portable tools. They are made from a special grade of high speed steel and are ground from the solid after heat treating. Catalogs cover Ford's complete line will be sent by writing M. A. FORD MFG. CO., INC., 739 W. First St., Dept. TJ, Davenport, Iowa.
INFORM-A-GRAM KEY No. A42-Y



THE VACUUM-GRIP POLISHING LATHE manufactured by Crozier Machine Tool Co. was designed to handle odd-shaped parts of copper, brass, aluminum, zinc, magnesium and plastic, as well as steel. With this lathe, objects such as oil can bodies or flat stampings,which cannot be held by chuck or collet, can be held firmly for polishing, burnishing and many other operations. The Model 1VPL Vacuum-Grip Polishing Lathe generates its own vacuum without piping or glands; it starts, holds the work, stops instantly and releases the work rapidly for low cost high production. It has a 1"-8 threaded spindle nose and is furnished with an 1800 or 3600 rpm, 220-440 or 550 volt 3-phase 50 or 60 cycle motor. Write CROZIER MACHINE TOOL CO., 684 N. Prairie Ave., Dept. 5-TD, Hawthorne, Calif.
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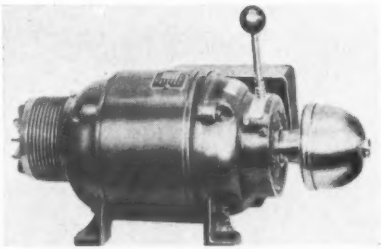
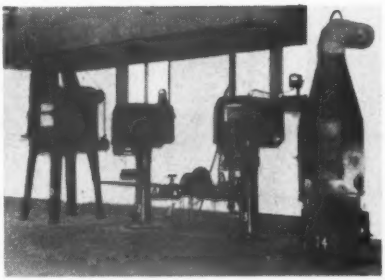


HEAT-TREATING FURNACES. Illustrated here is a four-furnace installation in a plant manufacturing bomb tail fuses. The equipment is part of the complete heat-treating line

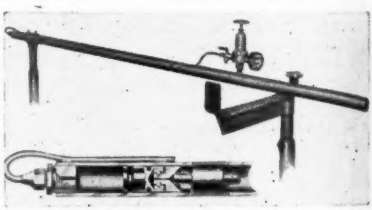


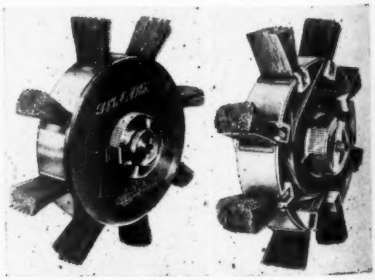
manufactured by the JOHNSON GAS APPLIANCE CO., Dept. T, 575 E. Ave., N. W., Cedar Rapids, Iowa. The equipment shown, from left to right, consists of one Johnson No. 820 Drawing Furnace; a Johnson No. 130-LT for Manganese Moly Steel (1475°); a Johnson No. 130 Hi-Speed Steel Heat-Treating Furnace equipped with Automatic Air-Gas Proportioner; and one Johnson No. 550 Liquid Hardening Furnace. These furnaces are equipped with Wheelco Pyrometers and provide speed, accuracy and economy of both fuel and space. Full particulars will be sent on request.
INFORM-A-GRAM KEY No. 605-Y

A NEW HELMET which gives welders complete relief from obnoxious fumes was originated by the Pullman Standard Car Manufacturing Co., with the aid of the Northwestern University Medical School and has now been developed and perfected by CHICAGO EYE SHIELD CO., 2300 Warren Blvd., Dept. TDJ, Chicago 11, Ill. This Cesco "Air-Flow" Welding Helmet provides clean, fresh air scientifically fed into the helmet through a supply tube encircling the lens holder. Since the air flows gently along the shell and travels to every outer edge, it is constantly circulated within the helmet; yet uncomfortable, cold-encouraging drafts are eliminated. The directional flow of fresh air prevents stale or fume-laden air from entering and cuts down heat, thereby contributing to the welder's comfort under all conditions. Write Chicago Eye Shield Co., for information.
INFORM-A-GRAM KEY No. 851-Y

BRUSH-BACKED SANDER. The Sand-O-Flex, just announced by the Exactone Tool & Die Co., is a new, brush-backed sanding wheel that sands, deburrs and finishes woods, metals, plastics, rubber products and many types of special materials. Abrasive strips are housed in the central magazine of the Sand-O-Flex. Eight of these strips extend through the housing and are held against the work by tough bristles which "cushion" the abrasive, making it possible to get in and around corners, hollow and fluted surfaces and small openings. Overall diameter (including brushes) is 8"; it weighs approximately 2¾ lbs fully loaded. A normal load of abrasive is 20'; reloading is done simply by unscrewing the serrated nut and removing the cover. The Sand-O-Flex fits all standard ½" and ⅝" motor shafts, stationary or flexible, or can be supplied to fit almost any shaft size on request. A ¼ hp electric motor will handle all normal operations as will most portable electric tools. Motor speed of 1750 rpm is recommended, decreasing in proportion to the coarseness of the abrasive used and according to the results desired. Additional data on the Sand-O-Flex will be forwarded by EXACTONE TOOL & DIE CO., 4373 Melrose Ave., Dept. TJ, Hollywood 27, Calif.
INFORM-A-GRAM KEY No. D80-Y

THE NEW BAR FEED manufactured by the Newton Manufacturing Co. of Los Angeles is a complete unit ready for use, including stands, seamless tube, pressure regulator and piston. It is made in seven sizes to take bar stock from 6' to 11' lengths. The airline con-

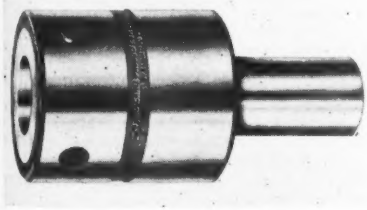




nects to the pressure regulator, delivering the desired pressure to the far end of the stock tube and actuating the piston. This pushes the stock into the lathe and against the stock stop under uniform pressure, thus eliminating length rejections caused by the variations of pressure inherent in mechanical and hand-feeding of stock. The pressure regulator is in full sight of the operator at all times and is quickly adjustable for various stock weights. The amount of line pressure necessary for stock feed is very small, i.e., a 4 pound pressure feeds ¼" by 8' stock. The piston, the forward end of which is of an inverted cone shape mounted on end thrust ball bearings, centers the stock and turns with it, thus holding it away from the feeder tube. Particulars are available from NEWTON MANUFACTURING CO., 215 W. Seventh St., Dept. TDJ, Los Angeles 14, Calif.
INFORM-A-GRAM KEY No. B15-Y

RELEASING-TYPE TAP HOLDER. Production tapping of close-limit threads in aircraft fittings on both automatics and turret lathes is now possible with the Z & W Releasing-Type Tap Holders which have been announced by the CHAMPION SALES CO., 2832 E. Grand Blvd., Dept. 5-T, Detroit 14, Mich. It is claimed that the design, extreme rigidity, positive drive and precision construction of these new tap holders result in the first thread always being a full thread instead of tapered or sharp. Positive depth control is assured since the release point is hightly accurate and the tap rotates freely on release. Blind holes are successfully bottomed with minimum risk of tap breakage, and the tap is withdrawn without damage to the threads. All working parts are made of the finest alloy steel, heat treated and finished to ten-thousandths limits. Although designed especially for use on automatic screw machines and turret lathes, these holders can be used on practically any type of tapping machine.
INFORM-A-GRAM KEY No. D82-Y

NEW INTERCHANGEABLE TYPE HOLDER. New Method Steel Stamps, Inc., have announced the availability of an interchangeable type holder for use with automatic roll marking devices. These results have been obtained by a wedge action in the assembly. An angle groove in the marking dies which mates with a beveled male ring on the insert retaining cover provides the wedging action. This permanent locking action holds the stamp inserts so firmly in place that there is no possibility of their moving during operation. Since the wedging action is so strong that the filling of the entire type opening with type or wedge block is unnecessary, the flexibility of the holder for marking parts interchangeably with either a small or large quantity of characters is increased and time for type changing and adjusting is reduced. NEW METHOD STEEL STAMPS, INC., Dept. J, 147 Jos. Campau, Detroit 7, Mich.
INFORM-A-GRAM KEY No. 122-Y



A NEW MAGNI - RAY ILLUMINATED MAGNIFIER, identified as Model 'C', has been added to the George Scherr Co.'s line to be used for inspection work where it is necessary to observe a very wide field at one time. The lens is 5" in diameter and manufactured of high-grade optical glass. It is encased in an aluminum alloy casting with a handle to facilitate transporting the magnifier to the work or for fastening to a machine tool to observe turning and grinding operations. The housing is clamped to a 16" upright rod extending from the base which permits swiveling both vertically and horizontally. The magnifying device is supported by a triangular, 12" x 12" x 12", cast iron base, covered with a deep green background to avoid eyestrain and for ease in inspection. The Model 'C' is equipped with two 4", 25 watt tubular bulbs especially silvered so that the light is reflected directly upon the work. Although designed for detecting cracks, imperfections and blow holes on large castings, it can be used in assembling small and delicate mechanisms; inspecting ground, polished or lapped surfaces; in drafting, machining and material receiving departments, etc. GEORGE SCHERR CO., Dept. T, 200-B Lafayette St., New York 12, N. Y.

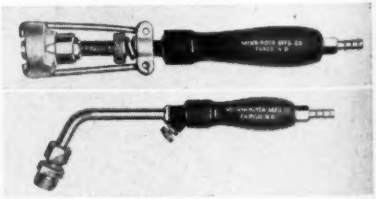
INFORM-A-GRAM KEY No. 490-Y

THE NEW SOLID CAST STEEL CUTTING TOOL introduced recently by Crobalt, Inc., is produced by melting a special Cobalt steel alloy in an indirect arc rocking electric furnace, super heating to well above 3000° F and casting in molds of the approximate tool size. This process gives the metal a preferred grain and carbide particle size at the time of casting, thus eliminating forging and later heat treating. These Powersteel solid tool bits retain their cutting ability on many types of work longer than heretofore considered possible and also permit speeds to be safely increased by 20%. They are not, however, recommended as a cure-all for every kind of cutting job. The specific types of work to which they are most ideally suited have been determined after an exhaustive series of tests. Powersteel solid tool bits are supplied hardened and ground, ready for use. They can be resharpened and used as long as the tool can be held in the holder and require no change in present equipment or shop practice. They are available in nine standard sizes of square bits and five sizes of rectangular bits. Although Powersteel is priced by the piece, approximate poundage is given in price lists for purposes of comparison. Descriptive bulletin is available. CROBALT, INC., 1352 N. Main St., Dept. TD, Ann Arbor, Mich.

INFORM-A-GRAM KEY No. 107-Y

SOLDERING AND OPEN FLAME TORCHES. The Schmidt soldering and open flame torches are fuel savers because the coppers do not have to be kept hot pending use; and also because the flame lights instantly and burns inside the copper with reflected heat and even exhaust baffled back, using every heat unit. The "Concealed Flame" Soldering Torch (upper view) will operate on artificial, natural or any of the bottled gases by using the proper mixing valve. By using the Schmidt Vaporizer, it will also operate on gasoline (no generating necessary). Coppers, which can be heated to any desired temperature for either continuous or intermittent soldering, are fastened by Monel hooks and can be changed instantly. The Schmidt Soldering Torch is available in four models. Illustrated below is one of the four styles of Schmidt Open Flame Torches. These torches will provide almost any desired flame from needle point to brush flame. Acid fumes will not affect the flame as the air and gas are mixed in the mixing valve. Only one hose is required with Schmidt Torches. MINN-KOTA FOUNDRY & MANUFACTURING CO., Dept. 805, Fargo, N. D.

INFORM-A-GRAM KEY No. 803-Y

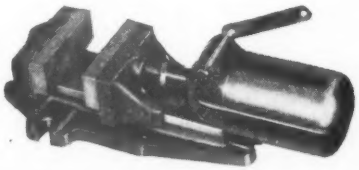


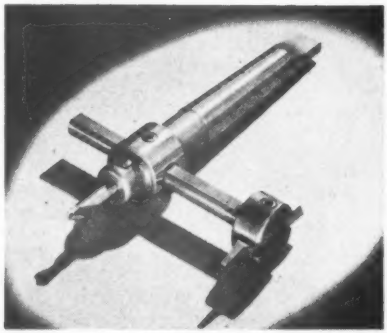
BORCOLOY (BOron-CObalt-alLOY) TOOL BITS. By using a centrifugal method of casting, General Aircraft Equipment, Inc., has been able to incorporate both boron, for wear resistance, and cobalt, for red hardness, into a new ferrous cutting alloy known as Borcoloy. It is available in two grades, Grade 5 with 12% cobalt and Grade 6 with 20% cobalt. The former is particularly adaptable to hogging and heavy duty cutting on high alloy steels, heat-treated bar stock or forgings. Because of its red hardness, a keen cutting edge is maintained even at very high temperatures. This grade is used only for solid tool bits. Grade 6, recommended for rough turning work as well as fine finishing at speeds too high or on material too abrasive for high speed steel, has a red hardness greater than that of Grade 5. This grade is available in solid tool bits as well as tipped tools. GENERAL AIRCRAFT EQUIPMENT, INC., Tool Division, South Norwalk, Conn., will send detailed information.
INFORM-A-GRAM KEY No. C79-Y

FOUR-CUTTER TOOL. A noteworthy item in State Manufacturing & Construction Co.'s line of boring and reaming tools is the new, improved State "Four-Cutter" illustrated here. It differs from the old model in that it has an individual adjustment for each bit instead of a single adjustment for all four bits. For this reason the body of the tool no longer has to be made in two sections and welded. This feature also facilitates extending any of the bits beyond the others in case of greater wear. The bodies of all standard State bars are made of quality alloy steel, heat treated for toughness. They are available in high speed steel, or with carbide tipped or cast alloy tipped bits. It is claimed that State Boring and Reaming Tools provide unusual chip clearance; easy bit regrinding; accurate, true bores; and greater speeds and feeds. Descriptive literature will be sent by STATE MANUFACTURING & CONSTRUCTION CO., Dept. TJ, Franklin, O.
INFORM-A-GRAM KEY No. 138-Y

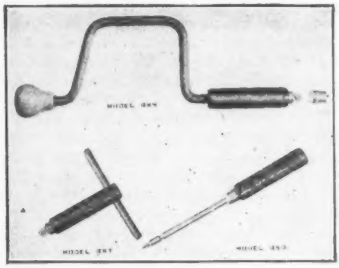
THE NEW AUTOMATIC AIR VISE manufactured by Cardinal Machine Co. incorporates a newly designed air cylinder which is a completely sealed unit requiring no service or attention other than ordinary lubrication. It is a complete power unit, including valves and control lever. Clamping pressure has been increased nearly 50% over that of the previous model by an increase in the cylinder bore. A new valve has been designed for this unit which is unaffected by water, oil, dirt or other foreign matter carried from the air supply; and is so located and adjustable to such a degree, that simple connections can be made to the drill spindles which automatically synchronize the opening and closing of the vise with the motion of the drill. Similar connections can be made in the case of milling machine applications or other applications in which the vise is clamped to a moving table. Detailed specifications and information on this new Model 4-AV Automatic Air Vise will be furnished by CARDINAL MACHINE CO., Dept. TDJ, 109 So. Jackson St., Glendale 5, Calif.
INFORM-A-GRAM KEY No. 226-Y

CIRCLE CUTTER. The Rieger Mfg. Co. has solved the problem of cutting disks or rings out of thin material by developing the Rieger Circle Cutter. This tool cuts 2" to 8" holes in sheets of metal, plastic, composition, fibre, wood, etc. The holes can be cut straight, chamfered, rounded or stepped, depending upon the contour of the tool bit. The Circle Cutter is applicable to drill presses, lathes or electric drills. The pilot to use is a standard ¼" stub drill and a standard ¼" x ¼" high speed steel tool bit should be used. Two styles of the Rieger Circle Cutter are available: Model CC-282-MT, as illustrated, and the CC-28-S which is the same but with a ½" straight shank. For descriptive literature, write THE RIEGER MFG. CO., Dept. TJ, Miamisburg, Ohio.
INFORM-A-GRAM KEY No. D81-Y



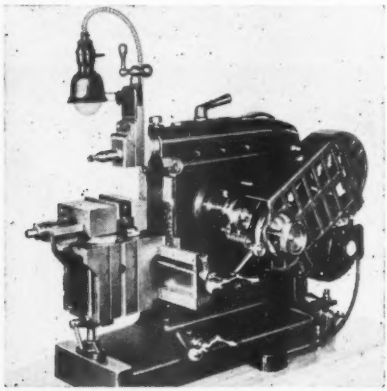


TORQUE WRENCHES. Crump Manufacturing Co. of Los Angeles now produces the Crump Speed-Tork Wrench which, it is claimed, removes all guesswork as to torque check point. This tool will torque both right and left hand nuts, bolts and screws without readjustment. Its design allows ample lubrication to be sealed in, assuring extreme accuracy and long life. The Speed-Tork Wrench

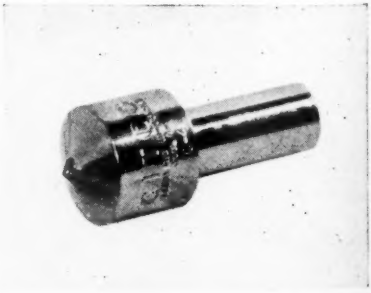


is adjustable from 1 in. lb. to 6 in. lbs. (by 1 in. lb.) and is available in three sizes. Models BWS, with offset speed handle; and BWT, with sliding T handle, are furnished with standard ⅜" square drive. Model BSD is a screw driver type and handles standard and Phillips screw tips. Write CRUMP MANUFACTURING CO., 1501 East 92nd St., Dept. TDJ, Los Angeles 2, Calif., for literature and prices.
INFORM-A-GRAM KEY No. D49-Y

THE AMMCO 7" SHAPER was especially designed for light production work, tool makers, model makers, experimental departments, home work shops, i.e., for jobs where a stroke of 7" or less is adequate. This machine will save a lot of time and expense in setup which would be required for larger shapers, and it eliminates the cost of operating a big shaper on small work. The tool head of the Ammco 7" is adjustable and graduated from 0 to 90° for angle settings. The base of the vise is also graduated for any angle from 0 to 90° on either side of center. Since the feed mechanism is of the reversible and adjustable type, adjustment of the position of the T-bolt in the feed adjusting lever provides a feed which varies from .003" to .018". The stroke is adjusted by loosening the lock nut on the end of the shank near the end of the feed eccentric and then adjusting the rocker arm block up or down. The proper stroke is indicated by the scale on the rocker arm. The adjustable countershaft has a 4 step V pulley with separate adjustment for V belt and motor belt. A ⅓ hp single phase motor or repulsion induction motor with overload switch is recommended. AUTOMOTIVE MAINTENANCE MACHINERY CO., 2100 Commonwealth Ave., Dept. TD, N. Chicago, Ill., will send their 8-page catalog describing the Ammco 7" Shaper on request.
INFORM-A-GRAM KEY No. 197-Y



SOLID COPPER DIAMOND TOOLS. Realizing the enormous heat conducting quality of solid copper, The Cleveland Industrial Tool Corp. have developed solid copper diamond dressing tools which not only throw off the effects of great heat rapidly, but also clamp the diamond more firmly in the setting. Tool men have claimed that more tool expense is incurred due to diamonds being burned up than to any other single factor. Heat generated in the dressing operation tends to reduce the diamond's efficiency, loosen the stone in the setting and often causes the stone to crack. These new "Citco" tools feature diamonds set in solid copper shanks as well as solid copper matrices. It is said that tests thus far have shown the life of an average diamond to be much longer than that of a stone of comparable value set in the usual type steel or sintered shank. THE CLEVELAND INDUSTRIAL TOOL CORP., Dept. J, 4713 Euclid Ave., Cleveland 3.
INFORM-A-GRAM KEY No. D44-Y



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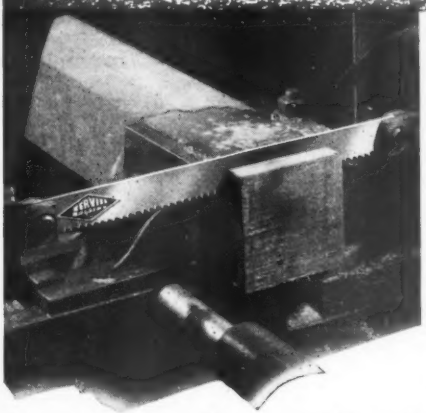

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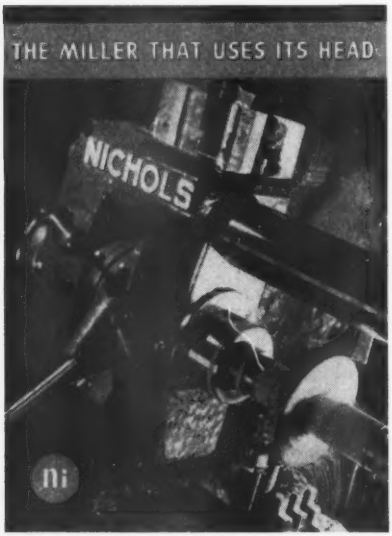
"THE MILLER THAT USES ITS HEAD" is the title of a 12-page catalog showing in picture-magazine style the design and uses to which the Nichols Miller can be applied. Published by W. H. NICHOLS & SONS, Dept. TD, Waltham, Mass., it illustrates with close-up views how this hand miller performs its fundamental function of bringing the cutter on a sliding head down to the work and also does the work of precision boring machines, lathes and grinders. Also illustrated and described are other processes on the miller, including contour milling, profile straddle milling, heavy hand milling and vertical milling. An important feature of the catalog is the manner in which the miller "uses its head," with the counterbalanced sliding head bringing the spindle to the work by manually controlled rise-and-fall motion.
INFORM-A-GRAM KEY No. 78-Y



ACCURATE DRESSING TO WITHIN .0001" can be obtained with the Vinco Model B-1 Dresser described in a 4-page illustrated bulletin published by the VINCO CORP., Dept. T, 8855 Schaefer Highway, Detroit, Mich. Light in weight and easy to handle, the B-1 Dresser has a wide range. It will dress convex shapes up to 180° of arc and up to 2½" radius and any combination of angles tangent to any radius—concave grooves up to 180° of arc on radii from 2" to 2½" and radii from .1250" to 2" using the half-circle attachment and any combination of angles tangent to any radius—wheels up to and including 14" diameter on practically all surface grinders, and on external, internal and cutter grinders, using Vinco sub-bases where necessary—and many combinations of angles and radii for grinding special and difficult forms.
INFORM-A-GRAM KEY No. 510-Y

FLUX FOR SILVER SOLDERING—A new 4-page bulletin issued by SUPERIOR FLUX CO., Dept. J, Public Square Bldg., Cleveland, Ohio, describes Superior No. 6 Flux for silver soldering (patented), and gives detailed instructions for its use. Superior No. 6 is an alkaline, noncorrosive, non-fuming flux, containing no free fluorides with an effective temperature range of 800 degrees (850° to 1650°). It is said to have a strong and prolonged action on metal oxides and also a powerful capillary action on the molten solder. It can be used with any low melting point brazing alloys or silver solders, for joining both ferrous and non-ferrous metals and alloys.
INFORM-A-GRAM KEY No. D62-Y

STEEL BLANKS for plug gages, end cutting tools, tool bits for boring bars, dowel pins, rollers and punches are presented in a 4-page booklet issued by the ACE DRILL CORP., Dept. J, 13385 Jennings St., Detroit 27, Mich. These blanks are widely used as inexpensive substitutes for plug gages when a tolerance of .0002" is sufficiently close. Tolerance permitting, they may be used instead of costly block gages on many inspection operations, and also for checking production micrometers.
INFORM-A-GRAM KEY No. D65-Y

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VITRIFIED BONDED DIAMOND WHEELS for sharpening carbide tools are described in an illustrated bulletin published by the NORTON CO., Dept. TDJ, Worcester 6, Mass. This all purpose type of wheel combines the fast cutting qualities of resinoid bonded diamond wheels with a resistance to wear and grooving approaching that of metal bonded diamond wheels. Vitrified bond is heat resistant and does not soften under the temperatures developed by grinding.
INFORM-A-GRAM KEY No. 545-Y

ALUMINUM MALLETS & HAMMER FACES have been developed by GREENE, TWEED & CO., Dept. D, Bronx Blvd. at 238th St., New York 66, N. Y., to replace all other types of soft faced striking tools and to provide a single mallet or hammer for every kind of work where such a striking tool is required. Besides being spark-proof and easily machined for refacing, aluminum is not brittle and does not chip. Aluminum is tougher and more enduring than leather or plastics, and withstands impacts better than copper or babbitt. At the same time, it has the important quality of absorbing shocks, thereby minimizing operator fatigue, and it absorbs metal chips because of its lasting softness. The new aluminum faces are interchangeable with the plastic, rawhide, copper and babbitt faces with which Basa Hammers have previously been supplied. Further information is available from the company.
INFORM-A-GRAM KEY No. 782-Y

CHROMIUM PLATED GAGE BLOCKS, flat, parallel and accurate to the millionth part of an inch, are pictorially described in a 24-page catalog and price list published by the DEARBORN GAGE CO., Dept. T, 22038 Beech St., Dearborn, Mich. The plated surfaces of these blocks will adhere exactly like steel surfaced gage blocks when slid together. In order to reduce stresses in the steel to a minimum, the size designation, insignia and other markings are etched on each block rather than stamped. Small rectangular type blocks which have the size designation on the gaging surface are now etched close to one end instead of in the center since center etching weakens many gage blocks sufficiently to allow warpage. Chromium Plated Gage Blocks of all types are offered individually or in working, inspection or laboratory sets.
INFORM-A-GRAM KEY No. 139-Y

MOTORIZE WITH MASTERDRIVES states a 16-page booklet issued by the MASTER ELECTRIC CO., Industrial Equipment Div., Dept. TD, Dayton 1, Ohio. Besides increasing mobility, Masterdrives permit more efficient layouts, save space and electric current. These

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● The following informative articles, in attractive pamphlet form, are all valuable for men engaged in tooling and production shop practices. Let them help you with your problem.

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Price: 10c each. The Group of 13, $1.00.

AMERICAN INDUSTRIAL PUBLISHERS

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drives also improve lighting and shop cleanliness. Among the many machines for which they are available are lathes, shapers, milling machines, punch presses, grinders, automatic screw machines, planers, gear machinery, boring mills and drilling machinery.
INFORM-A-GRAM KEY No. D83-Y

MOHAWK SUB-LANDS, precision cutting tools for those with the problem of machining stepped cavities, are pictorially described in a 4-page leaflet available from the MOHAWK TOOL CO., Dept. T, 21647 DeQuindre Rd., Hazel Park, Mich. The use of this type of tool provides savings in machine time, operations, man hours, setup fixtures and the inevitable waste of material.
INFORM-A-GRAM KEY No. B88-Y

SELF-OPENING DIE HEADS are described in literature available from the B-H INSTRUMENT CO., Dept. D, 3323 Avenue S, Brooklyn 10, N. Y. Diagrams and instructions for cutting a button die are given. A drawing and name of every part of the BHICO Die Head are shown with directions for setting the split die into the head.
INFORM-A-GRAM KEY No. 933-Y

QUICK-ACTION VISES, adaptable to many milling, drilling and assembly jobs, are featured in a 4-page leaflet issued by the FENN MFG. CO., Dept. T, 1841 Broad St., Hartford, Conn. Their outstanding advantage is in the time-saving, easy-operating method of holding a piece of work securely and rigidly during any number of machine operations. The powerful levers instantly pull the jaws together and hold the work in a grip that is far beyond any pressure exerted by the ordinary crank operated vise.
INFORM-A-GRAM KEY No. 291-Y

SPECIAL METALLURGICAL RESEARCH conducted by the ILLINOIS TOOL WORKS, Dept. T, 2501 N. Keeler Ave., Chicago 39, Ill., is pictorially described in an informative booklet issued by the company. Cold treatment is being studied to determine its effect on toughness and cutting efficiency, particularly with tools of intricate form. One illustration shows a furnace capable of tempering, at uniformly controlled temperatures, broaches up to 72 inches long.
INFORM-A-GRAM KEY No. 830-Y

PRECISION INSPECTION EQUIPMENT, including surface plates, angle plates, parallels, V Blocks, lapping plates, straight edges and dial gages, is presented in an illustrated booklet issued by the LOMBARD GOVERNOR

GIBSON-SPRINGS

TODAY—at War

BETTER THAN EVER

But...

while we can't say much about recent developments in spring making, the new knowledge and skills developed here to meet war requirements are producing mechanical springs better than those available before. Inquiries invited on specific problems.

ALL SIZES, TYPES AND MATERIALS

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(DIVISION OF ASSOCIATED SPRING CORPORATION)

Could you Machine this Work in 5 Simple Steps?

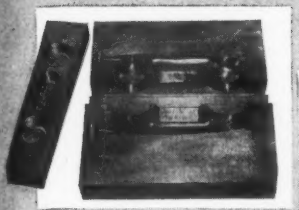

Photo courtesy
Parker Stamp Works, Inc.,
Hartford, Conn.

A Milwaukee 2D Rotary Head Milling Machine milled this Walkie-Talkie part mold in 5 simple steps in a total time of 90 hours — a typical speed, economy, and accuracy performance. Here is the sequence of operations:

1—Strap both mold halves together in an upright position on machine table and mill "Ear" and "Mouth" sections complete.

2—Mill elongated sections for core guide.

3—Position mold blocks on machine table as illustrated, lay out and mill handle grip section complete.

4—Mill core guide and recesses to form small pass at the "Mouth" end of molded part.

5—Mount core holding plate in vise and mill 3 recesses.

Total machining time — 90 hours.

Check these advantages of the Milwaukee 2D Rotary Head Milling Machine and how you can benefit from them in your own shop:

DIRECT . . . mills mold cavities in a single setup without the aid of templets or models, transmitting blueprint dimensions and outlines directly to the workpiece.

ACCURATE . . . chances for error are eliminated because there is no change in setup. Exact control of all combinations of cutting movements—possible only with this machine — transmits mathematical precision to the work.

FAST . . . initial job preparation and setup time is reduced to the minimum. Accurate performance of the machine saves operator's time and rapid production of intricate molds and dies is the result.

Write for Bulletin No. 1002C and complete information.

BUILDERS OF MILWAUKEE ROTARY HEAD MILLING MACHINE • FACE MILL GRINDER • AUTOMETRIC JIG BORER • SPEEDMILL • MIDGETMILL • CENTER SCOPE.

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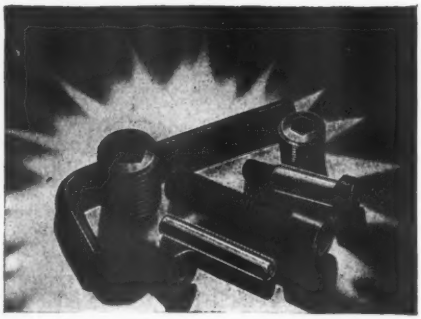
CORP., Dept. TD, Ashland, Mass. This manufacturer's No. 100 Lombard Dial Gauge Mount is rigidly constructed for all around machine shop use. It has a universal swivel with individual clamping, allowing adjustment without disturbing any other setting. Extensions are available and easily fitted into the tubular steel main support post.
INFORM-A-GRAM KEY No. 373-Y

RAM TYPE MILLING MACHINES for tool rooms and production shops are pictorially described in several bulletins available from the FRAY MACHINE TOOL CO., Dept. TD, 501 W. Windsor, Glendale 4, Calif. Without changing the work setup, machining operations with the Fray No. 7-B can be done at any angle in either or both the vertical and horizontal planes. By traversing the Ram on the Turret Slide, or by operating the Ram in its saddle, all milling, drilling or boring operations are possible at any desired angle. The Fray No. 9 is an all purpose machine that will handle a variety of operations on a single piece of work. For example it will do precision jig boring, slotting, drilling, tapping, keyway milling, end milling, profile milling, die sinking, plastic mold routing, serrating, spot facing, counterboring, punch forming and spline milling.
INFORM-A-GRAM KEY No. 296-Y

OFFSET BORING TOOLS for close tolerance boring at high speeds are illustrated in a bulletin available from the HOLCRAFT CORP., Dept. T, 354 Aliso St., Los Angeles 12, Calif. A handicap of many offset boring tools has been the necessity for running them at slow speed because of poor balance and lack of rigidity. The Holcraft offset boring tool has great rigidity, good balance and light weight, hence it can be run at the same cutting speeds as are used in high-speed lathe work, with remarkable freedom from chattering.
INFORM-A-GRAM KEY No. D84-Y

CARMET CARBIDE BLANKS. Carmet carbide tipped tools and AL tool shank steel in cold drawn bar form are catalogued in an 8-page folder recently issued by the ALLEGHENY LUDLUM STEEL CORP., Dept. TJ, Brackenridge, Pa. Specifications of standard Carmet blanks and tools, the standard and special grades of Carmet, and available sizes of AL tool shank steel are all listed.
INFORM-A-GRAM KEY No. 678-Y

DRILL PRESS VISES are illustrated in Catalog, No. 12, issued by the YOST MFG. CO., Dept. J, 1000 Main St., Meadville, Pa. Specifications and prices accompany each description. The Yost "Special" Machinists' Vise has an adjustable jaw swivel base that will hold work securely in any position of a circle parallel with the bench. The front pipe



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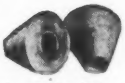

Cones for Wheel Balancing Machine "Accurately align hones two interrupted surfaces."

Aircraft Valve Guide. Valve tappet roller pin hole honed to 6 micro inch finish.

Bronze Valve. The Sunnen method of honing is used to secure a high finish and accuracy.

Aircraft Hydraulic Brake Cylinder. Honing 3 times faster than lapping—and gave a straighter hole.

Aircraft Piston Pin. Sunnen honing is twice as fast and gives a cleaner, better looking pin.

Stainless Steel Load Compensator Valve Seat. Hole is honed to .0002" limit.

Roller Bearing Outer Race. Finish improved from 12 micro-inches to 2 micro-inches.

Inner Bearing Ring "Accurately removes last 'tenth' of stock."

Saved time in producing a smooth accurate finish on this bronze remote control valve body.

Aviation Hydraulic Cylinder made of Aluminum-Alloy. Improves the quality of the bearing surface. An extremely smooth surface-finish is secured.

Hydraulic Two-Way Control Valve. Hole is honed to eliminate leakage.

Automobile Distributor Shaft Gears. Taper removed at a rate of 80-90 per hour.

Diesel Engine Fuel Injector Cylinder "So accurate that a piston can be fit within .00005 inch."

Mild Steel Clevis. Honing corrected errors of previous operations and maintained true alignment of two holes.

The coveted Army-Navy "E" waves over the Sunnen plant—evidence of the important part Sunnen equipment is playing in the war effort.

The Sunnen Precision Honing Machine handles any internal finishing job from .185" to 2.625", with accuracy guaranteed. Super-smooth finish of from 2 to 3 micro-inches can be produced.

Does not require skilled labor — you need no jigs nor fixtures — can be set up in one minute — and is economical to operate.

Find out how these advantages can be applied to the problems in your plant. A Sunnen engineer will be glad to call at your convenience — or write for a free bulletin.

SUNNEN PRODUCTS COMPANY

7947 Manchester Ave., St. Louis 17, Mo., *Canadian Factory: Chatham, Ont.*

SUNNEN HONING

• SPEED • ACCURACY • FINISH •

jaw of the Yost Combination Pipe Vise is reversible, thereby giving double the wear.
INFORM-A-GRAM KEY No. 579-Y

SEAMLESS BOILER TUBES are featured in a new 4-page illustrated folder recently issued by the BISSETT STEEL CO., Dept. J, 947 E. 67th St., Cleveland, Ohio. Bisco pressure tubes for stationary, marine and locomotive boilers are supplied in straight lengths or bent to your specifications. Available in low and medium straight carbon steel, as well as many alloy grades, they are guaranteed to bend easily and to withstand various types of forming such as expanding, swaging, flanging, beading and rolling, without developing splits or cracks. For jobs in which welding or coupling is not desirable, extra long seamless lengths are offered.
INFORM-A-GRAM KEY No. 603-Y

"CONE-LOK" JIG CATALOG 45-J, published by the N. A. WOODWORTH CO., Dept. T, 1300 E. Nine Mile Rd., Detroit 20, Mich., illustrates the operation of the "Cone-Lok" and explains six new features embodied in the Jig: maximum safety, mechanical simplicity, rugged construction, adaptability, chip protection and sealed lubrication. Several pages are devoted to data sheets and dimentional drawings of the three styles being manufactured by the Woodworth Company: the "up-clamp", the "bridge" and the 3 post type jigs.
INFORM-A-GRAM KEY No. 926-Y

SURE-FLOW COOLANT PUMPS are presented in Catalog 62 recently published by the LOGANSPORT MACHINE CO., INC., Dept. J, Logansport, Ind. The improved line of Logan Centrifugal Pumps includes twenty-seven sizes and types, each of which is designed to keep pace with the exacting requirments of manufacturers engaged in war production. Practical engineering data incorporates tables showing friction of viscous liquids and water in pumps.
INFORM-A-GRAM KEY No. 372-Y

OAKITE CRYSCOAT PROCESS and its application to ferrous rods and wire in wire drawing is described in a 2-page Special Service Report just issued by OAKITE PRODUCTS, INC., Dept. D, 57 Thames St., New York 6, N. Y. Based on production tests in a number of wire mills it tells how the microscopic phosphate coating results in more uniform appearance of wire, extends die life and helps mills increase tonnage. The Report gives all essential details for installing the process or making tests.
INFORM-A-GRAM KEY No. 121-Y

L & R PRECISION CLEANING MACHINE for ball bearings measuring up to 2" OD is

Use this *precision* INDEXING HEAD
on ANY Tool or Surface Grinder!

Holds straight shank tools up to 1" diameter in standard Hardinge Pull-in collets (Type 1-AM). Quill is ground to hold No. 4 Morse Taper tools. With conversion sleeve (furnished) holds tools up to No. 9 B & S Taper. Graduated 360° in 3 planes. Prompt delivery. ***Send coupon for illustrated folder.***

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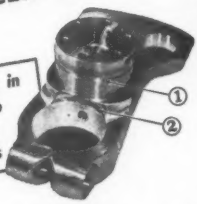
Tracer-Controlled MILLING

PROFILE MILLING SIMPLIFIED ...by TRACER CONTROL

Two Operations in a Single Setup without Changing Tools



• A prominent airplane engine manufacturer cut production costs, saved tying up expensive machinery and conserved skilled workmen by profile milling this radius of an engine crankshaft section on the Gorton Duplicator. Semi-skilled help operated this machine, obtaining smooth finish on the profiling of the irregular channel contour (1) on the part shown at right, and the milling of the channel (2) below this contour.

The Duplicator was set up with a special master in order to eliminate changing tools or resetting the work. A special fixture was used to hold the work at an angle to allow cutter access in milling the channel.

The Gorton Duplicator is the ideal machine for handling jobs like this where uniformity in quality and high precision repetition of all dimensions is required.

PRODUCTION DATA

Operations—Profile Mill .369" Radius and Mill Channel.
Machine—GORTON 9-J Super-Speed Duplicator.
Part—Rear of Crankshaft—Steel.
Cutter—Special .738" dia. Ball Cutter—4 Flute.
Holding Method—Special Fixture.
Feed—Manual.
Spindle Speed—500 r.p.m.
Stock Removed—⅛".
Floor-to-Floor Time—15 minutes per piece.

GORTON ENGINEERING SERVICE—

You are invited to consult Gorton engineers, without obligation, on your next production profile milling jobs. Gorton "Tracer Control" may give you the simplest, practical answer to lower cost production. Please submit part, print or specifications to your nearest Gorton Dealer or to the Gorton Factory at Racine, Wisconsin.

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CUTTER GRINDERS
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2 & 3 Dimensional PANTOGRAPHS
Vertical & Universal Head Super-Speed MILLERS
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described in a 4-page illustrated folder issued by L & R MFG. CO., Dept. D, 577 Elm St., Arlington, N.J. Fifty to one hundred ball bearings, of various sizes, fit in the basket of the rotary unit of the machine. In this first step of the cleaning cycle much of the foreign matter is removed from the bearing. In the second operation of the machine, each ball bearing goes through an individual cleaning process of pressure-cleaning. With minor adjustments the machine may also be adapted to the cleaning of gears and similar small parts and assemblies.

INFORM-A-GRAM KEY No. 352-Y

AUTOMATIC ELECTRIC GLUE POT with two-quart capacity is described in an illustrated Bulletin, No. B-4, published by the KINDT-COLLINS CO., Dept. T, 12651 Elmwood Ave., Cleveland 11, Ohio. The KINDT-COLLINS MASTER is completely automatic, permanently wet, and maintains a uniformly low temperature at all times. Its heating element, thermostatically controlled, operates within a vacuum sealed fluid which circulates between the outer and inner shells of the pot and transfers equal heat to all parts of the glue. This means that there are no hot spots to cause drying of glue. Low temperature prevents evaporation and keeps glue in perfect condition, and the thermos effect of the sealed liquid cuts current consumption to .6 of 1 KW per 8-hour day with a full pot of glue and brings the pot to maximum temperature from a cold start in 30 minutes.

INFORM-A-GRAM KEY No. D74-Y

WELDING & ASSEMBLY POSITIONERS are pictorially described in Bulletin 215 available from the RANSOME MACHINERY CO., Dept. TD, Dunellen, N. J. Special applications include positioning equipment for operations other than welding, which become everyday jobs for Ransome Positioners. The Positioners can also effect savings where it is necessary to position work in machine shops, foundries, and industrial plants for operations such as parts assembly, drilling, flame hardening, flame cutting, hard surfacing, chipping, grinding, etc. Photos, diagrams, specifications and important features of the positioners, as well as load rating tables, are included in Bulletin 215.

INFORM-A-GRAM KEY No. 437-Y

TOOLCRAFT ACCESSORIES designed to help tool and die makers standardize and simplify their operations are described in a new catalog section containing specifications, sizes, other details and prices of the Tool Craft line of ground stock, ready-cut die blocks, punch

METAL CUTTING COSTS
Reduced with
KALAMAZOO
Band Saw

CONTINUOUS HIGH SPEED CUTTING on any metal and all shapes—

Step-up PRODUCTION in cutting off bars, rods, angles, tubes, etc., to lengths with this accurate, low cost, metal cutting coolant equipped band saw.

Why use large, high priced equipment on jobs more easily handled by this NEW, modern method?

Quick setup—automatic operation—plugs in anywhere. Saves time and labor. Cuts investment and maintenance.

Two sizes—8" x 16" and 8" x 24". Four speeds. Available without coolant attachment for ntermittent cutting.

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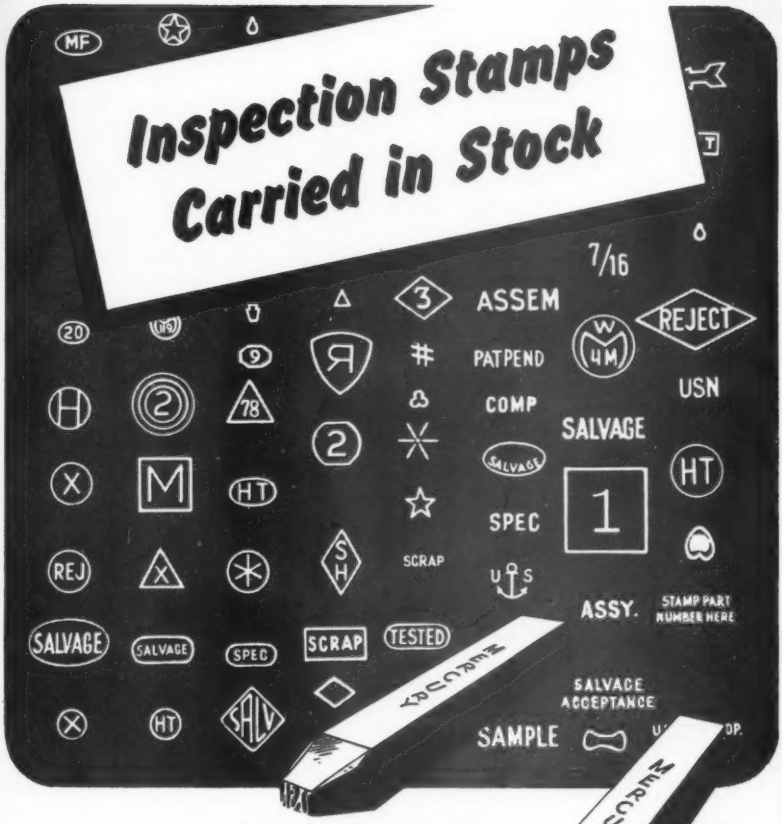

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plates and stripper plates. This literature is available from the TOOL CRAFT CO., Dept. J, 1835 Westchester Ave., New York 60, N. Y., which also supplies a complete line of ready-to-use die bushings, step-down and quill type die punches and stripper guide bushings. Their ground stock is recommended for the production of machine parts, gages, templates, parallels, test and cutting tools and other items.
INFORM-A-GRAM KEY No. C23-Y

HOW TO SAVE MANPOWER is described in the new Roto-Finish bulletin by showing how Roto-Finish mechanical de-burring and finishing may be performed by one operator, permitting transfer of skilled help to other vital production jobs. Just released by the STRUGIS PRODUCTS CO., Dept. D, 400 Jacobs St., Sturgis, Mich., accuracy of the Roto-Finish Process is illustrated and described, with information on the closely controlled cutting actions that provide fine surface finishing to heavy grinding cuts.
INFORM-A-GRAM KEY No. C17-Y

PUNCHES & DIES, used on all types of punch presses and press breaks and available in all sizes from ⅛" to 3⅛" in increments of $\frac{1}{64}$", and in all numbered and lettered sizes, are described in a new catalog released by the WIEDEMANN MACHINE CO., Dept. T, 1815-31 Sedgley Ave., Philadelphia 32, Pa. Produced from high carbon water hardened steel, they have a clearance of .006" to .010". Shank diameters and punch diameters of all punches, as well as OD and ID of dies are ground concentric on all standard sizes shown in the catalog, permitting interchangeability of punches and dies without realigning the die. This assures smoother working surfaces, and results in lower stripping pressures and longer punch and die life.
INFORM-A-GRAM KEY No. 818-Y

SHANKLESS HIGH SPEED DRILL, with a continuous flute, produced by roll-forging and hot twisting, and driven by a removable taper shank known as a "Drill Driver" is featured in Price and Technical Data Manual No. S-1 published by the REPUBLIC DRILL & TOOL CO., Dept. T, 322 S. Green St., Chicago 7, Ill. The Shankless Drill produces more holes than the Taper Shank Drill because of its greater strength and superior qualities for resisting margin wear. It also has a tough "shock-absorber" neck which reduces drill breakage.
INFORM-A-GRAM KEY No. 440-Y

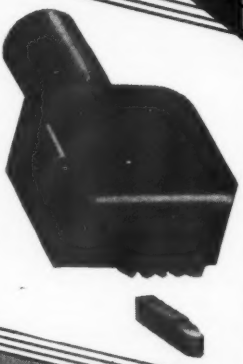
AIRCRAFT TOOLS CATALOG which lists and pictures high-quality precision tools for the aircraft and other manufacturing trades

For simplified gang-stamping with faster interchanging of type

HERCULES HOLDERS

Features include:

- Stamps numbers or letters in any untempered metal or material.
- Exclusive extra body and shoulder style of type for added strength.
- No parts to loosen or wear out—made of shock-resisting alloy tool steel.
- Simplest interchangeable type holder made.

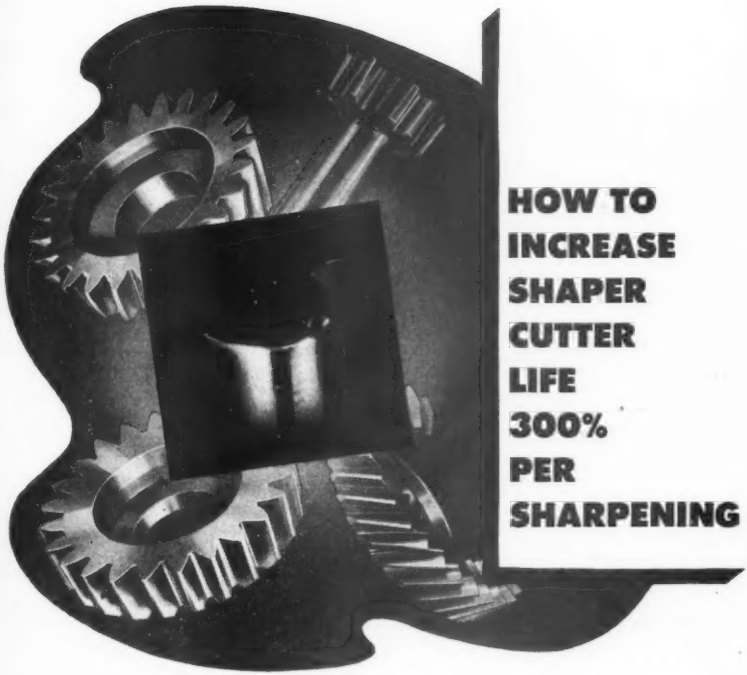


Especially suited for parts numbering on steel, stainless steel and alloys, castings, brass, aluminum, etc., these HERCULES Holders are available in both hand and press styles for one, two line, curved and convexed or concaved marking. Type is removable by mere finger pressure on clip, automatically self-locking in position.

Write for literature

THE ACROMARK CO.

5-15 MORRELL STREET, ELIZABETH 4, NEW JERSEY



HOW TO INCREASE SHAPER CUTTER LIFE 300% PER SHARPENING

One of the simplest methods of increasing the life of shaper cutters is to protect the cutter against nicks like the one above. Normal amount of stock removal to sharpen a Michigan shaper cutter is only around 0.007 inches on the average. A nick like this one may mean the necessity of removing .025 to .030 inches of metal to resharpen the tool. The potential output of the tool for three additional sharpenings has thus been wasted.

While nicks in gear cutting tools may be caused by a variety of reasons, the most prevalent one is carelessness in handling. The very hardness which gives Michigan gear cutting tools their outstanding performance means that such tools require careful handling to prevent chipping, nicking or breakage. Extensive field investigation has revealed that in 4 out of 5 cases of damaged tools, the damage is due to incorrect or careless tool handling to and from machines, in the store-room, in sharpening (sharpening heat-checks which later result in tool failure), etc.

Do you have a copy of "Shaping"? Ask for Bulletin GS-42.

ORIGINATORS of GEAR SHAPING

MICHIGAN TOOL COMPANY

7171 E. McNICHOLS ROAD . . DETROIT 12, U. S. A.

BUY U.S. BONDS STAMPS

has been recently issued by the ZEPHYR MFG. CO., Dept. J., 201 Hindry Ave., Inglewood, Calif. Actual size photographs of the tools in use are shown. The line includes angle drills, drill adaptors, micrometer stop countersinks, countersink cutters and pilots, back spotfacers and countersinks, quick-change chucks for new or broken drills, drill guides, nutplate drill fixtures and other precision tools for production and maintenance use.
INFORM-A-GRAM KEY No. C22-Y

"PRECISION LOFTING" is the title of an attractive brochure issued by the TEMPLATE REPRODUCTION CO., Dept. TD, 401 North Broad St., Philadelphia 8, Pa. It gives management, engineering, tooling and production executives an insight into the "lofting" method for producing, with accurate templates, a variety of products ranging from automobiles, aircraft and household appliances, to small components of every description. Basically, the method—which is already in use in a majority of the larger aircraft plants— involves the mechanical reproduction of full-size detail drawings, directly on tooling materials. Considerable manual duplication of scale drawings, and manual transferring from blueprints to tooling materials are thereby eliminated, and substantial savings in time are made.
INFORM-A-GRAM KEY No. D75-Y

PRE-SELECTRIC POWER FEEDER, designed especially for deep hole drilling, is featured in a leaflet issued by the JAMES H. KNAPP CO., Dept. D, 4920 Loma Vista Ave., Los Angeles 11, Cal. This unit can be easily and quickly attached to an ordinary drill press, making it semi-automatic in operation or automatic with indexing. The Pre-Selectric Power Feeder has timed, instantly reversible, adjustable torque. Attached to your drill press it speeds up wood, metal or plastic operations.
INFORM-A-GRAM KEY No. B18-Y

"ULTRA-FINISH" GAGE BLOCKS are described in an illustrated 4-page folder published by the FONDA GAGE CO., Dept. D, Stamford, Conn. A new machine lapping compound developed by Fonda engineers is designed to provide the nearest approach to a plane surface yet devised for metal. It makes the use of oil or other films unnecessary in wringing Fonda Gage Blocks, thereby improving the operation and avoiding any need of gage block calibration to correct errors introduced by film in fine-precision measurement.
INFORM-A-GRAM KEY No. 998-Y

METAL CUTTING SAW BLADES are featured in a pocket-size catalog issued by the CAPEWELL MFG. CO., Dept. DJ, Hartford, Conn. Technite Hack Saw Blades, made of molybdenum high speed steel, heat treated by the Capewell method, are recommended for cutting high speed, stainless and other hard or tough alloy steels. A section headed "General Information" sets forth some useful tips on selection of the right blade for the job.
INFORM-A-GRAM KEY No. 117-Y

AMES *Precision* BENCH LATHE

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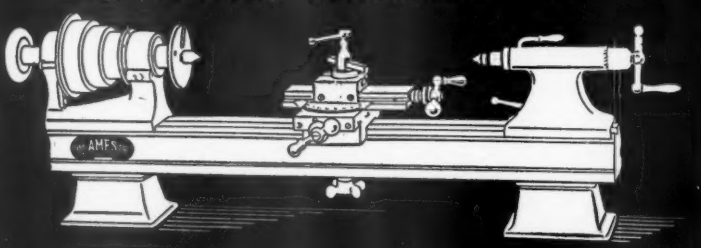

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Set of 6 pictured (No. JR) sizes ½", ⅝", ¾", ⅞", 1", 1¼", has dimensional range from .495" to 1.295". This set satisfies practically every reaming need of the average die, tool, and maintenance shop. Set includes pilots. Two left-hand flutes spiral opposite to right-hand flute, shearing mirror-smooth finishes in any metal or plastic.

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SCIENCE • RESEARCH • METHODS • TOOLING
PRODUCTION • TRADE NEWS AND REPORTS

Standards for Drafting Room Practices

The American Standards Association at the request of the War Production Board is beginning to develop a series of American War Standards for drawing and drafting room practice that will correlate the practices of the Army and Navy with those of industry.

This is a difficult undertaking. Blueprints, plans, and drawings which are all involved are used in the design and manufacture of even the simplest mechanical device. ASA has long had a regular committee on Drawing and Drafting Room Practice working under the joint technical leadership of the American Society of Mechanical Engineers and the Society for the Promotion of Engineering Education. Standards developed by this Committee have laid down the simple basic elements of the subject.

The present existing diversity of drafting practices between the various branches of the Armed Forces and Industry, together with its attendant waste and confusion and delays in providing the drawings needed for war equipment, has long been recognized by the Services and Industry alike. In accordance with a joint directive of the Secretaries of War and Navy to their departments, the Services are setting up committees within their respective organizations to bring together the practices in the various branches of the Services and through the ASA to correlate these practices.

Work on these new War Standards has already started. It is being financed by the War Production Board through an already existing Government contract under which the ASA has since July 1942 completed 88 standards of direct concern to the war effort and has under development some 68 more.

Subjects to be covered in the standardization of drawing and drafting room practice are the following: abbreviations; methods of indicating and specifying threads; methods of lettering; drawing forms and sizes; graphical, diagrammatic and schematic symbols; methods of indicating and specifying materials; methods of indicating and specifying finishes; methods of dimensioning and indicating tolerances and methods of numbering drawings. Special emphasis is laid upon completing work on the first five subjects at an early date.

Carboloy Offers Training Program to Aid Shell Producers

The Carboloy Company, Inc., Detroit, Michigan has developed a training program designed to enable shell manufacturers to obtain better overall performance and increased service life from carbide tools. The need for acceleration in shell production will bring into existence scores of new shell plants. Because of the corresponding increase in utilization of carbide tools, the Carboloy Company specifically designed the training program to assist in keeping consumption of critical carbide shell machining tools at levels corresponding to the available output rate for such tools by the carbide industry.

In new shell plants the Carboloy training course will provide basic training in the use of carbide tools in general, and will also give specific instructions in the use of carbide tools for shell machining operations. In shell plants where car-

bide tools have been in use for some time, the training program will serve as a refresher course and will also furnish new information on improved practices in machining. The program will also enable plants to train operators to quickly evaluate carbide tool performance, and to know what to do if performance falls below standard.

The Carboloy special training program is comprised of: (1) A series of slide films on "Carbides", "Grinding Carbide Tools", "Designing Tools", "Brazing", "Chip Breakers", and "Putting Tools to Work". (2) A new set of 60 training charts pointing out good practice in the use of carbide tools for machining of shells. The charts cover design, brazing, grinding and inspecting and application of carbide tools specifically intended for machining of shells. (3) Instruction leaflets for distribution to operators. The leaflets contain complete reproductions of the charts mentioned above.

Distribution of the course will be through Carboloy Company District Offices. Carboloy field engineers and district managers in these offices are available to help individual shell plants put the course into operation.

Industrial Color Conditioning

The Du Pont Finishes Division of the E. I. Du Pont De Nemours and Company, Wilmington, Delaware have announced a postwar program for scientifically "color conditioning" industrial interiors. Color conditioning is the result of extensive study of employing functional color to improve employee efficiency, health, comfort and morale.

The new system, described as the science of determining the correct industrial color environment for maximum vision, was developed by Du Pont in collaboration with Faber Birren, leading industrial color authority. Increased production, improved quality of workmanship and reduced personal injuries are listed as among the benefits of industrial color conditioning. The technique is designed to protect employees against eyestrain by reducing glare and eliminating extreme contrasts between light and dark, as well as by abolishing light-robbing dark areas. Restraint is recommended in the use of color especially the distracting, over-stimulating hues.

Correct colors have been established by research for factory walls, for machines, and for backgrounds within the field of vision. The studies show that only a few color combinations need be utilized. Although the program is designed to introduce more color into the industrial scene, it is not mere interior decoration of plants, but the outcome of long-term research which has already added much to industrial efficiency. Hundreds of case histories based on color installations in all types of plants were compiled and studied.

New colors have been developed for industrial interiors. These new colors are not decorators' colors in the bright clear range, but hues subdued in tone and are unobtrusive and practical. Illuminating and color engineers studied light-reflectance qualities, hue characteristics, influence of different kinds of illumination, and psychological characteristics.

The color conditioning colors are available, at present, only in limited quantities because raw materials for paint are critically short.

GE Jet Engine

According to General Electric engineers, who developed the GE Jet Engine for the fastest plane in the world, jet propulsion accomplishments achieved quickly under wartime pressure in the United States already have blazed leading trails in this new field of dynamic motive power.

The operation of this powerful jet engine is simple. Air rushes into vents in front of the plane's wings, and funnels to the engine where it is compressed by a swiftly moving impeller. The air is whipped by the impeller to combustion chambers, where fuel (usually kerosene) burns fiercely. This dynamically expands the air and increases its veloc-

If it's a small part

. . . turn it with Precision, Speed and Profit on a

SHELDON LATHE

Model S-56
10″ Precision Lathe

Engineered for precision shop and tool room work. Rigidly built to stand up and hold its close accuracy under round-the-clock operation. This is a quality machine tool in every detail, yet is moderate in price . . . a lathe that stands out far ahead of others. (The lathe selected by U. S. Army, the Navy and the Marine Corp., for mechanized machine shop instrument repair shops, etc.)

Contact us or your local Sheldon dealer for prices, engineering data, deliveries, etc.

- Bronze or anti-friction bearings
- "1" Collet capacity
- 11¼-inch plus swing
- Double-walled apron
- Large hardened and ground spindle
- Extreme accuracy
- Convenient controls
- Underneath V-belt motor drive
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All SHELDON lead screws are cut on the finest Pratt & Whitney "Super-precision" lead screw machine.

Builders of Good Lathes Since 1919

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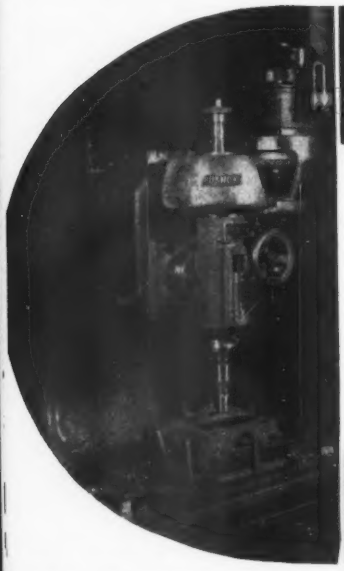
ity. The hot air and gases then pass through a turbine wheel, which is connected by shaft with the impeller. This turbine wheel spins thousands of times a minute at temperatures of 1,500 degrees Fahrenheit and higher. The blast passes out the jet exhaust but leaves no streak of flame.

GE engineers list the following facts about their jet engine: (1) The new GE Jet is the most powerful engine in the air today. (2) This super jet engine drives the Army Air Forces' Lockheed P-80 Shooting Star faster than any other plane. (3) Propellerless planes powered by the GE Jet function smoothly at altitudes higher than planes propelled by conventional reciprocating motors can operate efficiently. (4) This most powerful aircraft engine generates virtually no vibration. That eliminates a factor which causes much pilot fatigue. (5) The GE Jet pressurizes the cabin, providing air for the pilot to breathe even in the substratosphere. (6) The GE Jet is far lighter than conventional reciprocating engines of anything like comparative power. (7) The jet plane achieves its peak performance without propeller, radiator, oil cooling system, supercharger, carburetor and the many instruments and complex controls which are needed on aircraft powered by conventional engines. (8) A GE Jet can be replaced in a Shooting Star in fifteen minutes. It takes eight to nine hours with a full crew to do the same job with a conventional engine. The jet engine has only approximately one-tenth as many moving parts as does the ordinary reciprocating motor. (9) The Shooting Star, powered by the GE Jet is extremely maneuverable and excellent in rate and angle of climb at high speeds. (10) No new flight problems are presented to a pilot by the jet engine. Any competent pilot can fly a jet propelled plane.

Figures to show that industry will be faced with a serious shortage of all-round skilled workers unless there is an immediate and marked increase in the number of young men being trained for craftsmen, were presented by William F. Patterson, Washington, D. C., Director of Apprentice-

Shortage of Skilled Workers Predicted



MILLING - DRILLING - BORING ATTACHMENT for Heavy Duty Operations

Photo shows Rusnok head used to convert an old type milling machine into high speed, versatile, productive equipment. Uses many types of cutters on a wide range of work. Easily mounted—tilts to any angle. Large size spindle (No. 9 B & S taper). Takes 1/16" to 3/4" end mills. Large quill with 4" travel, counter balanced, hardened and ground. Six speeds 250 to 3000 RPM. Lever and worm feeds. ½ h.p. motor. Specially engineered by RUSNOK to meet modern demands for high speed, high precision, heavy duty end mill operations.

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Floating Holders
MULTIPLE TAPPING
DRILL PRESSES
TURRET LATHES OR SCREW MACHINES
BORING MILLS
THE Scully-Jones Ball Bearing Type Floating Holders drive and float on Ball Bearings for a smooth rolling action... compensating for misalignment between machine spindle and work.
Eliminate scrap from Ball-Mouthed or oversize holes when reaming or precision tapping on AUTOMATIC SCREW MACHINES, LATHES, TURRET LATHES, DRILL PRESSES or MULTIMATIC MACHINES.
Optional Straight, Threaded or Tapered Shanks... Collets with Straight or Tapered holes.
Scully-Jones AND COMPANY
1901 SOUTH ROCKWELL STREET • CHICAGO, U. S. A.

Training Service, War Manpower Commission, to the Elmira, N. Y. chapter of the American Society of Tool Engineers.

Mr. Patterson pointed out that statistical studies disclosed a sharp rise in the median age of skilled workers and that extensive and thorough apprentice training programs must be set up to replace craftsmen who are retiring because of increased age.

Mr. Patterson continued, "Formerly, a large percentage of our skilled workers came from other countries. Now that source is closed to us. Skilled labor is a scarce article and we cannot call upon a magician to draw craftsmen out of a hat.

"In the strictly machinist group—machinists, toolmakers, diemakers and millwrights—we find an alarming rise in the median age since the turn of the century. The median age in 1900 was 32.1. In 1920, it was 35 and in 1940 it was 40.2. Fifty percent of the machine trades craftsmen in 1940 were more than 40 years old. We are not training enough apprentices to replace even the old-age group, to say nothing of those workers who die or retire before 65 years.

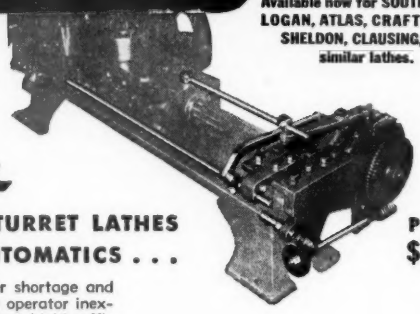
"There were 96,800 craftsmen in the tool and die industry in 1940. It was found by our analysts that to maintain that number we must have in training constantly 11,325 apprentices. This means that, nationally, we must be training one apprentice for every nine journeymen, 1,700 apprentices must be graduated and 4,100 hired every year in your trade."

The training of discharged war veterans is the best solution to the skilled labor problem, Mr. Patterson stated. He said that ATS is receiving many inquiries regarding the possibilities of apprentice training from men who have been discharged and from men still in service. Veterans now in apprentice training are proving themselves capable and dependable workers.

"Veterans taking apprentice training in approved establishments are eligible for a subsistence allowance as provided by the G. I. Bill of Rights. These payments range from $50 to $75 a month, depending on whether or not the veteran

Newton AUTOMAT

Available now for SOUTH BEND, LOGAN, ATLAS, CRAFTSMAN, SHELDON, CLAUSING, and similar lathes.



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HAND-OPERATED TURRET LATHES INTO RELIABLE AUTOMATICS . . .

PRICE $295

HERE is relief from manpower shortage and losses from rejects incurred by operator inexperience and fatigue—a practical, highly efficient means of greatly increasing output and profits, easily installed on any bench lathe. The unit is very simple in design and of rugged, enduring construction—as foolproof as a mechanical device can be. The set of standard cams will handle almost any job. The member which actuates the cross slide is a torque rod which cushions the shock of forming and cut-off operations, assures uniform feed and accurate repeating, prolongs tool life. An automatic cut-out, quickly adjustable to work of different character, reduces tool spoilage and parts rejection. A Schrader-engineered three-way valve operates any collet closer. Put this easily installed, money-making unit to work for you now. It will pay its cost in less than 30 days!

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...TO SAVE YOUR TIME

SIEWEK

FIXTURE CLAMPS AND FITTINGS

24 DIFFERENT TYPES... 3 SIZES EACH!

Also... JACK LOCKS • CAM LOCKS • FIXTURE LOCKS • REST BUTTONS • HAND KNOBS • RESTS, CAMS AND EQUALIZING WASHERS

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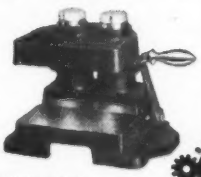
Rapid Clamping Drill Jigs



"SIEWEK TOOLS ARE SPEEDING THE WAR EFFORT"

There is no advantage in designing special clamps when Siewek Clamps will meet your needs perfectly nine times out of ten... In fact, you can buy these complete assemblies for less than the cost of designing them on your own drawing boards—and save 50 to 75% of the designing time... Siewek Clamps require a minimum of details to fit them to the job.

Right angle pressure is provided for secure holding... Siewek Clamps last for years because parts are specially heat-treated and hardened... This assures maximum service and safety.

Write today for full size template drawings from which tracings can be made for your layouts.

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has dependents."

It is of utmost importance that apprentice programs are set up now so that sound apprenticeship will be available to the veterans when they will be seeking training to become craftsmen in increasingly larger numbers, Mr. Patterson declared.

Enough electric equipment to furnish a good-sized factory plus a small hotel is installed on each floating drydock the Navy is using to make emergency repairs of warships far from their most advanced permanent bases, engineers of General Electric disclosed recently.

Floating Factories Repair Warships in Battle Areas

These floating factories, recently revealed to be in action, are changing the concept of naval warfare by enabling strategists to plan ocean-going operations without dependence on the availability of fixed bases.

In operation these mobile drydocks prepare a warship for repair by literally lifting the damaged vessel out of the water, thus giving workmen access to any part of the hull or deck, the same as if the ship were being overhauled on land. This is achieved by admitting water to sealed compartments so that the drydock submerges. When this is accomplished, the damaged vessel is floated over the dock or the dock is submerged under the vessel. Then water is pumped out of the compartments, and the drydock, with the ship under repair now on it in a rack, arises to the surface. In this position, the damaged ship is completely out of the water, with its hull exposed, and examination or repair is made possible.

Though several different models of floating drydocks are presently in operation, the newest and most radical of these is the advanced base sectional type, in which 10 separate units, or barges, are joined together to form a repair dock that can accommodate a battleship. When this type dock is assembled, the separate barges, form a surface nearly

Rawhide
The best "soft" hammers and mallets are rawhide — tough, resilient, long-lasting C/R mechanical rawhide. They strike effective blows without battering or marring . . . without fatiguing re-coil. They hold their true striking surfaces. Sizes and weights for every need. Hammers are malleable iron with replaceable C/R Rawhide insert faces.
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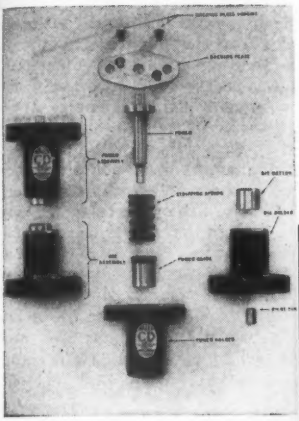


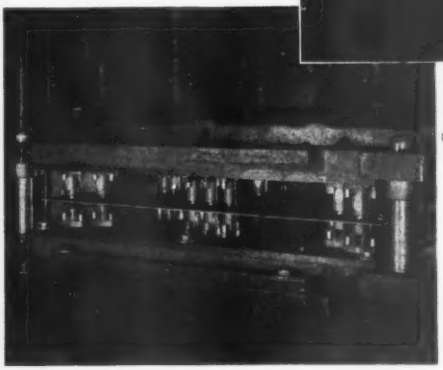
Showing all parts of Wales Type "CD" Units assembled and disassembled. These parts are easily assembled and disassembled for quick changes.

SIMPLIFY... STANDARDIZE... SAVE WITH...

WALES

TYPE "CD"

HOLE PUNCHING UNITS



Illustrating the work being punched with stamping press ram in down position.

Showing the work in a press brake set-up. Note unobstructed feeding of the work.

● The customary expensive and time-consuming methods usually associated with building a single purpose die to punch a multiplicity of holes *is eliminated* with Wales Type "CD" Hole Punching Units.

SAVE making special punches and punch plates, special stripper plates and special die buttons and die plates.

SIMPLIFY die design and die making.

STANDARDIZED Wales punches, dies, and stripping mechanisms permit units and parts to be carried in stock for setting up and servicing.

Write TODAY for functionally colored, 32-page catalog with 48 illustrations showing these Units being set up and operating in stamping presses and press brakes.

WALES-STRIPPIT CORPORATION

355 Payne Avenue
North Tonawanda,
New York
(Between Buffalo and Niagara Falls)

GEORGE F. WALES, President
Specialists in Punching and Notching Equipment

as long as three football fields and with side walls rising higher than a five-story building.

Unable to navigate under their own power, sectional drydocks are towed by other vessels to a protected location and there assembled and put into operation.

Quality Control for Resistance Welding of Switchgear

A system of quality control of resistance welding that has been used successfully for over two years in manufacturing switchgear cubicles and equipment is the subject of an AIEE Spring Program paper by R. S. Inglis, R. P. McCants, and L. S. Hobson of the Switchgear Division, General Electric Company. Stating that standardization of the process is essential to its control, the authors describe in detail the methods by which it is attained.

Although on highly repetitive jobs it is necessary to establish the proper welding procedure only once and continue on that basis for the duration of the job, variable welding conditions such as are encountered in the fabrication of switchgear equipment make it necessary to have a specific procedure for each combination of materials. In the absence of basic fundamental data for such conditions, the authors state that it was originally necessary to undertake an extensive program to determine the effects of such variables as material type and thickness, welding current, pressure, and time. Many thousands of tests were made in which these factors were independently varied, and from this study it was possible to establish the proper welding procedures and the physical properties of the welds. These methods of testing and control continue in use.

The authors report that since the structural stability of assemblies which are fabricated by resistance welding depends not only upon the quality of the parts used but upon the strength and ductility of the welds—two things which are most difficult to determine without

MEASURING A PLUG GAGE WITH LIGHT WAVES

using an optical flat, a toolmakers flat and a gage block

The formula is:

$$D = h + \left(.000012 \times N \times \frac{W}{w}\right)$$

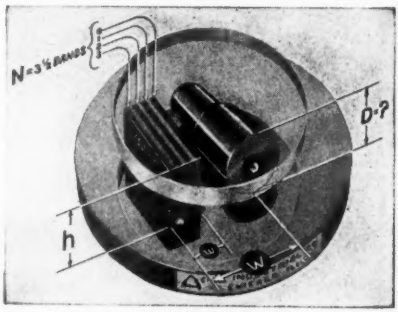
Substitute the actual values

$$D = .750 + \left(.000012 \times 3\tfrac{1}{2} \times \frac{1\ 7/16''}{23/64''}\right)$$

and get the answer

D = .750168 inch.

It's just that simple!



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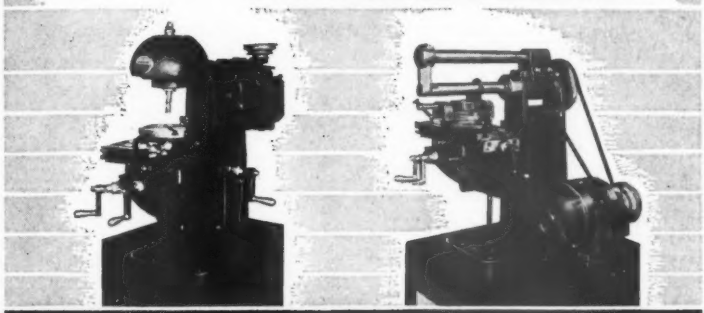
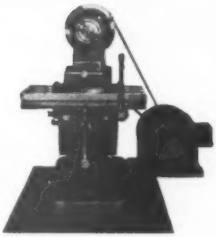
ONE BENCH MACHINE FOR *BOTH* HORIZONTAL and VERTICAL MILLING



Vertical Mill *Horizontal Mill and Overarm*

FOR PRECISION TOOL WORK OR HIGH-SPEED PRODUCTION



Production Mill with Rack and Pinion Feed

benchmaster—offers a bench milling machine easily convertible from a conventional horizontal to a vertical miller by simply interchanging the spindle attachments.

ACCURATE • VERSATILE • LOW PRICED

SPECIFICATIONS: Table size—6" x 14"—Three Tee slots 3/8", 2" center • Longitudinal travel 8½" • Traverse travel 5½" • Vertical travel 8½" on vertical mill—9½" horizontal mill • Height 28" • Weight (less motor) 215 lbs. • Requires 1/3 h. p. motor • Spindle speeds (standard 1725 rpm motor) 450-850-1400-2100 rpm.

benchmaster tools manufacturing company

2952 w. pico, los angeles 6, cal.

destruction of the fabricated parts—three welded specimens are prepared each hour under the same conditions of production welding. These specimens are tested in torsion in special testing machines to determine ultimate torque, angle of twist, and weld diameter. Torsional testing gives a simple and accurate means of determining the weld strength and ductility, since the strength is proportional to the ultimate torque and weld diameter, and the ductility is proportional to the angle of twist.

Moreover, the paper states that a standardized welding procedure makes it necessary to have properly calibrated, reliable welding machines. Thyratron synchronous controls assure that once the machine has been set for a definite procedure, all of the welds made will be consistent. In addition, plug-in jacks are used to check them at regular intervals.

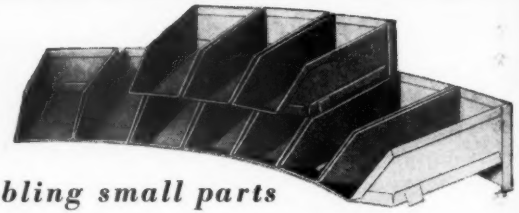
These factors are combined to give a quality number or index and hourly averages are plotted on a control chart posted on each machine. A weekly record sheet gives a complete analysis of weld quality control, by showing the relative performance of each machine, and the relative effect of materials and welding methods on the over-all level of weld quality.

Color Code for Lubrication of Machine Tools

Unskilled labor can be effectively guided in applying the right grease or oil to machinery through use of a new American War Standard based on a simple system of matching colors, according to the American Standards Association.

At the request of the National Machine Tool Builders Association and the War Production Board, the American Standards Association has developed this war standard. The purpose is to facilitate the lubrication service of machinery and also to cut down the increasing amount of damage to machinery in war plants from misuse of lubricants by un-

NEW BINS



for assembling small parts

Floors slope to feed parts to front — end reaching and fumbling.

Bins taper toward front to form convenient semi-circle — keep all bins within easy reach.

Nesting, locking construction for rigid set-ups, easily changed when necessary.

All-welded construction. Rolled, smooth edges.

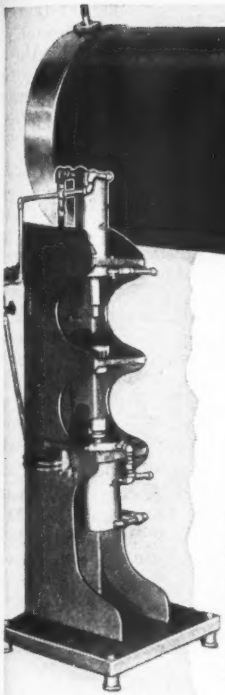
Two sizes—tapered or straight edges. Hoppers available for steady work.

Manufactured and sold in Canada exclusively by Walter H. Wickware, Ottawa.

Write Stackbin Corporation, 97 Troy St., Providence 1, R. I., for further details and low prices.

STACKBIN SYSTEM

"Stacked and Still Accessible"

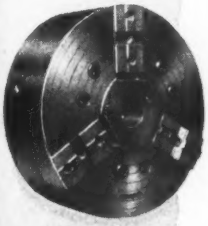


Two Anker-Holth Stationary Air Cylinders on press for assembling patented rubber cushion bearings at Bushings, Inc., Berkley, Michigan.

Help Solve the Manpower Crisis with

AIRGRIP Dual Action STATIONARY CYLINDERS

Wherever controlled pull, push, lift or grip is needed, "Airgrip" *Dual Action* Stationary Air Cylinders provide the fast, safe, smooth, dependable power that does the job right. Require no skilled labor to take apart or assemble. No tie-rods; either end of cylinder can be removed, leaving the rest completely assembled. Piston packings graphite-treated for permanent lubrication. No manual adjustments of copper-braided asbestos packing necessary. Wear automatically taken up by air pressure within cylinder. Made to the same precision standards that characterize "Airgrip" Revolving Air Cylinders.



When buying new lathes, specify "Airgrip" Chucks and Revolving Air Cylinders.

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Two-Fisted Gripping Power

Air pressure plus cam-wedge action gives *Double Gripping Power.* Jaws locked mechanically when gripping either externally or internally. Holds securely even if air supply fails.

OTHER ANKER-HOLTH COST REDUCERS include Air Operated Collets, Arbors, Mandrels, Drill Press Chucks, 2- and 3-Jaw Finger and Compensating Chucks, Revolving Air Cylinders, Lubricating Assemblies, 3- or 4-way Air Valves (hand or foot operated), etc. Also Hydraulic Pressure Units and Fittings.

Write, mentioning products on which you desire Bulletins

ANKER-HOLTH MFG. CO.

2735 Connors Street Port Huron, Michigan

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skilled labor. According to the National Machine Tool Builders Association, damaged machinery has led to serious delay in war production, not only because the machines were out of production for a certain time, but also because materials for repair are often difficult to obtain.

The Color Code for Lubrication of Machinery aims to make the application of the right lubricant so simple that the least skilled employee can hardly make a mistake. A basic system of color markings is designated to be applied to the containers of a given lubricant and also to the points where each lubricant should be applied. The lubricating device, such as an oil can or grease gun, and the lubrication fitting to be serviced are marked with the same color. The service man has only to match colors to be sure that each lubricant is being used in the right place.

The color code covers eight general classes of lubricants, each of which is designated by an identification color. The oils are divided into five classes and the greases into three. For both oils and greases, there is a general purpose class and a special purpose class. The three remaining classes of oils are: machine tool spindle oils, gear oils, and hydraulic oils. The third class of grease is for anti-friction bearings.

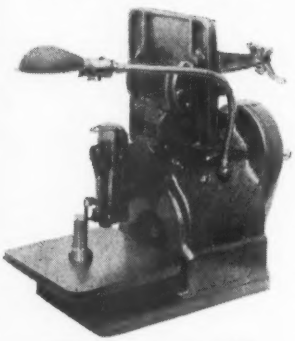
When an industrial plant uses more than one kind of lubricant in the same class, the code recommends that distinction between these lubricants be made by the use of different numbers marked on the identification color for the class. For example, three types of machine tool spindle oil used by Company A might be marked by the numbers 1, 2, and 3 on a clearly visible patch of yellow-green. The machine parts to which the oil is to be applied would be marked in the same way. All the maintenance man has to do is to match color and number.

Copies of the American War Standard Color Code for Lubrication of Machinery, Z47.1-1945, may be obtained from the American Standards Association, 70 East 45th Street, New York 17, N. Y., at twenty cents per copy.

The **"DUPLEX"** *machine-files*

FLANGED PUNCHES - BLIND CAVITIES - MOULDS - DIES

Uses a controlled downward movement with an adjustable stroke.



DIES filed on upper table when swung down.

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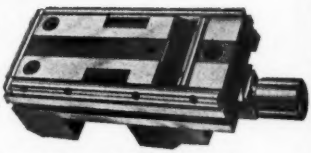
SINE VISES *Master Gage Builders!*

For SURFACE GRINDING, LAYOUT, INSPECTION OF GAGES, TOOLS, AND FINE INSTRUMENTS

No. 2 (Sine of 5") TILTS ONE WAY as Sine Bar. Opens Three Inches Size, 6"x2½"x2¼"

No. 3 TILTS THREE WAYS Sine of 6" & 3" Size 7½"x3½"x2¾" Opens 3½"



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Features Include:

1. Precision Sine Rolls
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Accuracy is the law of the Cadillac plant. From the testing of incoming material to the final inspection of the finished product, every effort is concentrated on making the finest, the most precisely accurate gages it is possible to produce. There are none finer.

More than 10,000 gages in the standard sizes are in stock awaiting your order to ship.

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Glenn L. Martin to Aid Training of Naval Flyers

Combining their training facilities to provide efficient crews for the twenty JRM Mars, the U. S. Navy and The Glenn L. Martin Company have opened the first of a series of maintenance and operational classes at the Company's plant in Baltimore, Md.

The first group to arrive for the course consisted of eighty Naval officers and enlisted men. This entering class will grow to 104 in July. According to present schedules, almost half the Navy men will have been trained by the end of the first four months.

Detailed outlines of the work to be covered have been planned on the basis of experience compiled from the records of the Mars' operations between the Alameda and Honolulu bases, under the command of Capt. C. H. Schildhauer, the Navy's flying boat expert now stationed at Patuxent, Md.

The Mars, which "has proved to be a most efficient cargo carrier in terms of cost per ton-mile", according to Fleet Admiral Ernest J. King, Chief of Naval Operations, has been serviced and maintained by a basic ground crew cadre (group) of 28 Naval aviation technicians. This establishes the training pattern for the new school.

No more than these are required to operate the Mars from the ground crew's standpoint. They have been handling their job so well that the Mars has not been beached for major overhaul since January.

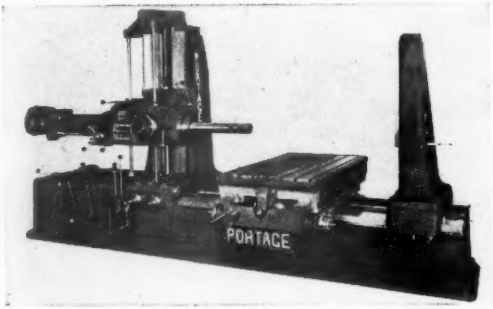
The flight crew of the Mars consists of the plane commander, a first and second pilot, one or two navigators, two radiomen, one flight engineer, three flight mechanics, and one or two flight orderlies, depending upon the length of flight or type of passenger-cargo.

The Navy has also learned through experience that ground crews have not been required at Pearl Harbor. This adds to the general economy of the world's largest and most efficient flying boat. The Mars operates on a 36-hour turn around over its regular route.

PORTAGE

4 INCH BAR HORIZONTAL BORING, DRILLING & MILLING MACHINE

ROTARY TABLES



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● Designed and built to meet the need for speed and accuracy demanded of today's production.

WRITE TODAY for fully illustrated bulletin giving detailed description of the many features of this Horizontal Boring, Drilling and Milling Machine. No obligation.

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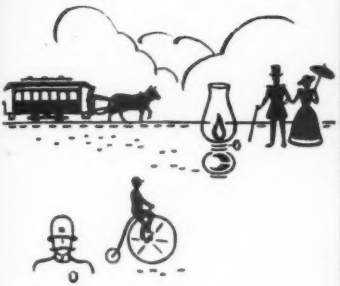

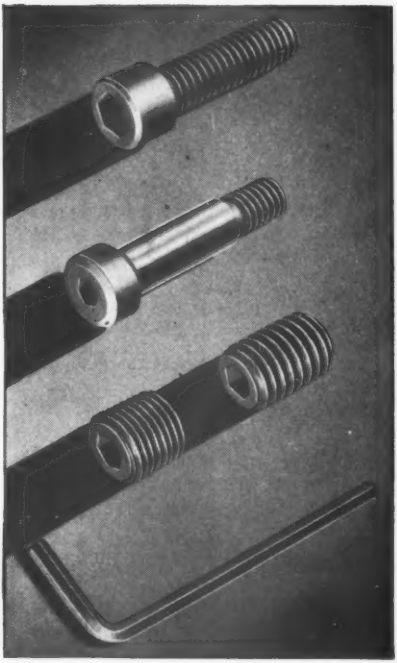

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in Threaded Products

In 1872, our first screw wobbled momentarily on the bar end, and then, with the help of the cut-off tool, detached itself and fell among its turnings.

During the ensuing seventy-three years, millions of its successors have flowed from a thousand machines, and each one has been fondled as was that first screw.

That's why The Chicago Screw Company, with the advent of socket screw products, was ideally prepared not only to manufacture and expand the use of these items but, of vastly more importance to industry, to improve the standard of quality to a perfection never before known for this commodity . . . This standard is reflected in the complete line of Chicago "Safety Plus" Socket Screws.

These Fine Products are sold only thru Authorized Distributors.

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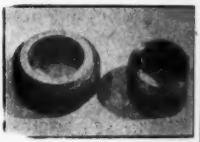
DIECASTING DIGEST

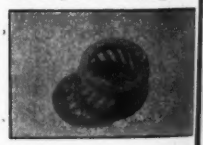
VII — Rotors Now Made by Die Casting

Recent production with the Lester-Phoenix pre-fill injection system indicates that die casting of pure aluminum into rotors results in improved electrical performance and great savings of time and money. The rotor shown here, made by the Sperry Gyroscope Co., must pass exceptionally rigid tests for porosity, which reduces electrical conductivity. It is die cast in a single cavity die at the rate of 100 to 125 per hour, and there are very few rejections.

In casting aluminum through the insert of electrical iron, the hot metal must be forced through the 17 channels in such a way that there is no gas or air trapped within the aluminum. This is accomplished by pre-fill injection,



Top left: Rotor casting as it comes from die. Right: Finished rotor, with excess iron and aluminum machined off, ground inside and out. Bottom: Actual aluminum casting with the iron laminations dissolved out. Rotors can be die cast with integral fan blades for air cooling.



which eliminates the two sources of porosity in die castings—gas pockets and shrinkage voids.

COMPLETE FACTS NOW AVAILABLE

Write for "Die Casting Precision Parts", which contains interesting case histories of savings in the die casting process. Lester-Phoenix, Inc., 2625 Church Ave., Cleveland 13, Ohio.

Slow-squeeze Injection Packs Metal Into Die; Prevents Forming of Gas Pockets, Shrinkage Voids

Shown above is one of the four Lester-Phoenix HHP-3X-S die casting machines in the Nassau plant of the Sperry Gyroscope Company at Great Neck, Long Island, N.Y. These machines are built to cast aluminum, brass or magnesium, and are equipped with the patented Lester-Phoenix pre-fill injection system, with injection pressures up to 33,000 psi.

To hold and confine such pressures within the dies, where they will be effective, the massive cast steel beam frame of this Lester-Phoenix machine provides a die locking pressure of 600 tons. Write for details.

FREE!

Write for free data on modern die casting methods and equipment.

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LESTER-PHOENIX
DIE CASTING MACHINES

SHOP AIDS

for YOU and YOUR JOB!

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"SPEED CUTTING" FILM PORTRAYS ABRASIVE CUT-OFF METHOD. A. P. de Sanno & Son, Inc., Phoenixville, Pa., manufacturers of Radiac Abrasive Cut-Off Machines and Radiac Abrasive Cut-Off Discs have recently made available a 16mm sound film describing the abrasive cut-off method. It dramatically shows the effectiveness of the Abrasive disc method, the cutting-off action and cutting-off time of many metals, the features of various types of Radiac Cut-Off Machines, and the de Sanno manufacturing facilities which supply both the machine and the abrasive cut-off discs. An especially interesting sequence depicts the action of a Radiac Abrasive Cut-Off Disc from which large segments have purposely been broken out. The disc performs its cutting task with little difference in action or speed, thus indicating its strength. Other sequences reveal complete demonstrations of Radiac Cut-Off Machines cutting off many types of stock including 1 5/16" roller bearing stock and 1" square unannealed stainless steel, both cut in the short time of 2½ seconds.

The film is available to engineering societies, training schools, educational institutions and manufacturers who engage in cutting-off operations, either production or miscellaneous. All requests should be mailed to A. P. de Sanno and Son, Inc., Dept. TD, Radiac Machine Sales Div., 106 S. 16th St., Philadelphia 2, Pa.

THE CAST METALS HANDBOOK, 3rd Edition, compiled by the American Foundrymen's Assn., is a complete, accurate and authoritative reference book dealing exclusively with the engineering properties of cast metals. It is directed to those who design metal parts and who specify or purchase cast metals for industrial products. The vast amount of data in the book contains results from joint compilation by several hundred practical men. This third edition is completely revised due to the great improvements made in cast metals of recent years. The Cast Metals Handbook is recognized as a standard treatise on the engineering usefulness of all cast metals. The recommendations to designers of castings will be of great help to engineer-designers. Recommendations to buyers of castings are of use to purchasing agents. The significance of strength and ductility tests of metals may be profitably studied by all mechanical product and designing engineers. Separate and extensive sections deal with steel, malleable iron, cast iron and non-ferrous metals. Copious bibliographies and an extensive cross index add to the book's usefulness. Cloth bound, 745 pages, 258 illustrations, 204 tables. Published by American Foundrymen's Association, 222 West Adams St., Chicago 6, Ill., and priced at $6.00.

THE BALL AND ROLLER BEARING STANDARD SPECIFICATION BOOK, published by the Anti-Friction Bearing Manufacturers Association, Inc., Dept. TD, 60 East 42nd St., New York, N. Y., is a compilation presented by the Standards Committees of the Anti-Friction Bearing Industry. The recommendations of the committees, after approval by the sponsors of the particular group, are referred to the Society of Automotive Engineers (SAE) and the American Standards Association (ASA) for consideration and adoption as national standards. The committees also cooperate with the Army, Navy, Air Corps and other governmental agencies, and also with technical organizations, in the preparation of specifications. The Standards Committees, that is the Annular Bearing Engineers Committee (ABEC), the Thrust Bearing Engineers Committees (TBEC), and the Roller Bearing Engineers Committee, (RBEC), have realized the necessity for an industry standard specification covering types of bearings, a uniform basic part numbering system, standardized workmanship, inspection, tests, and simplified form of tabulating dimensional data. This information has been prepared in the form of a ball and roller bearing specification, with the purpose in view of eliminating many separate specifications and to assist designers in using standard bearings.

INFORM-A-GRAM KEY No. C27-Y

RADIANT HEATING. That wrought iron pipe is the overwhelming choice for radiant heating systems in buildings ranging from monumental type structures to low-cost houses is revealed in the new handbook on "Radiant Heating", just issued by A. M. Byers Co., Dept. TD, Pittsburgh, Pa.

Chief purpose of the 52-page book is to serve as a working manual both for the designer and the fabricator. Detailed procedure is listed for figuring heat losses and piping requirements, designing the coils, supply and return mains. Factual data is presented on the relative merits of locating the coils in the floor and ceiling. Included is a full page drawing of a floor-type radiant heating system for a representative industrial building in which both sinuous coils and grids are used to advantage.

Reported to be the most complete manual on radiant heating ever published, the book records in picture and text 23 typical installations covering a wide range of structures, including churches, medical buildings, libraries, taverns, factory buildings, office buildings and residences.

In addition to chapters on the theory, history, and achievements of radiant heating in more than a thousand installations functioning in the United States, the handbook devotes 12 pages to answering the 34 questions that technical men have asked most frequently during the past seven years at lectures on radiant heating and in letters to the A. M. Byers Company.

Tables are reproduced showing the heat transfer properties of various piping materials. There is also a section devoted to pipe bending and welding.

INFORM-A-GRAM KEY No. D48-Y

GEAR SHAPER CUTTERS. A striking 24-page technical bulletin entitled "Gear Shaping and Shaper Cutters" (Bulletin No. C-45), containing information of value to everyone engaged in the mass production of spur and helical gears, has been made available by Colonial Tool Co., Ltd., of Windsor, Ontario, leading Canadian manufacturer of cutting tools. The booklet is a companion volume to "Hobs and Hobbing" (Bulletin H-44) recently issued by Colonial.

Solutions to the major problems in the manufacture of accurate and therefore quiet gears by the shaping process are discussed in this booklet. Information concerning effect of machine errors and set-up errors is given. Also discussed are desirable tooth forms, root fillets, etc. Mating of hobbed and shaped gears is discussed together with when to use one and when the other. For a clear understanding of the principles involved, the process whereby a gear is generated by a shaper cutter is pictorially presented.

Also included in the bulletin is valuable information on correct set-up, checking, and sharpening of shaper cutters for best results; nomenclature of shaper cutter terms; a list of the pertinent items to be included in order to prevent errors and delays; etc.

The 4 basic types of standard and 4 basic "special" Colonial shaper cutters, available in roughing, semi-finishing, and finishing form and in disc, hub, tapered shank, and straight shank forms, are illustrated and charts of sizes available in standard cutters are given.

INFORM-A-GRAM KEY No. C40-Y

DIAMOND TOOLS, THEIR CARE AND MAINTENANCE is the title of a meaty, pocket size booklet offered by J. K. SMIT & SONS, INC., Dept. T, 157 Chambers Street, New York 7, N. Y. Everyone knows that grinding wheels require dressing, and every grinding machine operator knows he can dress them. Despite that, little technical information appears to have been released about this most frequent machine shop operation. With this in mind, the publishers have prepared this new book for the express purpose of helping men in the shop to appreciate and solve their problems. While not intended as a treatise on the subject, the book covers in understandable, down to earth fashion, everything the operator needs to know about the various types of diamond tools, and how to set them up and use them most effectively. The instructions are made doubly clear by good photographs and drawings. There are sections on chatter marks and how to eliminate them; importance of proper coolants and how to use them; tapered face dressing troubles and how to minimize them; and proper depth and speed of dressing. A table of eight simple precautions and what will happen if you neglect them is a valuable feature of this interesting shop book.

INFORM-A-GRAM KEY No. 48-Y

THE MO-MAX HANDBOOK. (Fifth Edition) prepared by J. V. Emmons, Metallurgist for The Cleveland Twist Drill Co., is now available for distribution. Included among its contents are details on the standard and special analyses of MO-MAX, brief instructions on forging, annealing, hardening, quenching, tempering, the new sub-zero treatments, tool performance, comparison of microstructures of MO-MAX and 18-4-1 high speed steels, Rockwell hardness curves and other informative charts. Copies may be obtained free of charge by addressing The Cleveland Twist Drill Co. (Dept. P), 1260 East 49th St. Cleveland 14, Ohio.

INFORM-A-GRAM KEY No. 241-Y

101 WELDING IDEAS FOR LOW COST MAINTENANCE are illustrated and explained in typical, profitable applications of Shield-Arc Welding in a wide variety of industries, by this 16-page publication of The Lincoln

HOW TO PUT A TAPER ON TOUGH TUNGSTEN!

The Dumore No. 44

This Grinder operates at speeds from 6,600 to 38,500 R. P. M. Perfect for either internal or external grinding—accurate to .0001". Can be used on a lathe with as little as 8" swing.

6 OTHER MODELS... 3 HAND GRINDERS!

Get this Catalog which describes the complete Dumore line. Write for your copy today!

DUMORE PRECISION GRINDER MOUNTED ON STANDARD LATHE LICKS DIFFICULT SHAPING JOB!

Putting a taper on this small tungsten rod proved too tough a job for cutting tools so a wise shopman solved his problem with a Dumore No. 44 Precision Grinder. Mounted on a standard lathe and using a special 6" wheel running at 5,000 R. P. M. the Dumore handled the job easily, accurately and at a satisfactory cost. Thousands of other shops are reporting similar results with their Dumores. The flexibility and adaptability of this unique precision grinder gives skillful toolmen the means for licking many a tough job. Discover its possibilities yourself—write for Catalog today!

The Dumore Company, Tool Division, Dept. TE42, Racine, Wis.

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Electric Co., Dept. DJ, 12818 Coit Rd., Cleveland 1, Ohio. These Shield-Arc Welding jobs apply to the reclamation of worn parts, repair of broken parts and structures, replacement of worn or broken equipment with Lincoln-fabricated, welded designs, and construction of special shop equipment and structures. Welded construction assures users of secure, light weight, rigid, strong, modern products. Shield-Arc welded addition of new metal to worn parts usually produces parts that are more serviceable than the originals at substantial savings over replacement and forestalls costly production interruptions. These progressive "Welderies" save their cost of operation many times over. To work out welding procedures for particular maintenance problems, procedure guides are available from the nearest Lincoln branch office or the Lincoln Electric plant on written request.
INFORM-A-GRAM KEY No. 597-Y

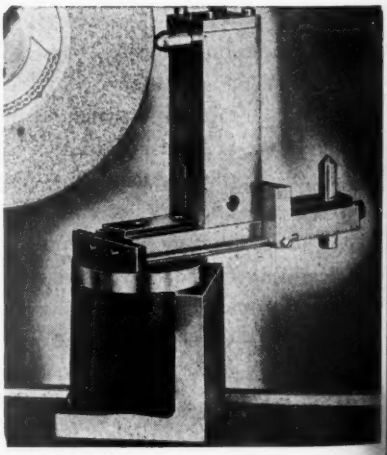
HIGH SPEED CARBIDE MILLING and **HOW TO GRIND THE CUTTERS** are the subjects of two companion papers just released by the Technical and Service Publications Department of Cincinnati Milling and Grinding Machines, Inc. One paper, "Recommendations for High Speed Carbide Milling" (M-1376), has been prepared from the viewpoint of actual cutting operations and presents general recommendations on speeds, feeds, cutter angles, grades of carbides, and efficiency of metal removal; the other paper, "Recommendations for Grinding of Cutters for High Speed Carbide Milling" (M-1377), deals with the general equipment needed for carbide cutter grinding, and its most effective use, including special sections on grinding carbide tipped face mills, primary clearance angles, methods of marking cutters for identification, and the like. Both papers include useful tables and graphs, and the instructions in both are written in language that even the "green" man can understand. Address CINCINNATI MILLING AND GRINDING MACHINES, INC., Dept. TD, Cincinnati 9, Ohio.
INFORM-A-GRAM KEY No. 233-Y

THERMOSWITCHES for complete temperature regulation in a wide variety of applications are pictorially described in a 44-page booklet issued by FENWAL, INC., Dept. TD, 200 Pleasant St., Ashland, Mass. More than twenty Fenwal products, including installation drawings and photographs for both temperature and pressure control apparatus, are presented. Fenwal Thermoswitches may be used throughout the entire range of temperature control work, from sub-zero to 1200° F. Various types have been designed for the control of temperatures of solids, gases and liquids.
INFORM-A-GRAM KEY No. B87-Y

THE "FORM-MASTER"

ANGLE & RADIUS DRESSER

A sturdy, quality instrument designed by form-grinding specialists to dress both angles and radius at low cost. Two 1/3 ct. diamonds and instrument case included—$150.00 complete.



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Large range.
Chatterless and dustproof.
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Simple to operate.
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J. & S. TOOL CO.
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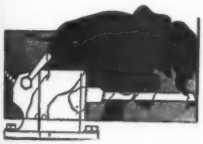
MEAD MIDGET AIR CLAMPS

Horizontal and Vertical!



Both models deliver 80 lbs. pressure on a line pressure of 100 lbs. They'll save countless man-hours in assembly operations involving welding, riveting, bolting, etc. *Advantages over mechanical clamps:* 1. Any number can be operated by single master valve. 2. Easily installed in cramped corners. 3. Equal ram pressure at any stroke point. Send for new Mead AIR POWER Catalog, describing our line of Air Clamps, Air Vises, Air Presses, Work Feeders, Valves, Controls, etc.

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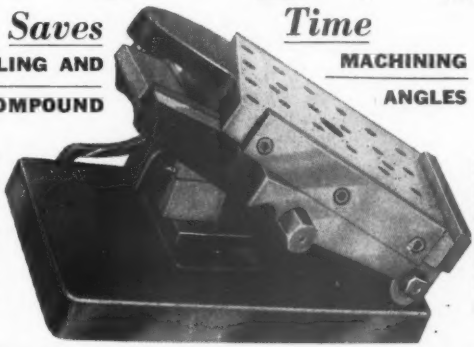
Saves Time

ON BORING, DRILLING AND MACHINING SINGLE OR COMPOUND ANGLES



Roto-Sine uses new method of obtaining both single and compound angles. By use of gage blocks, Roto-Sine provides accurate, quick means of obtaining angles of rotation without use of graduations. Every tool shop will find Roto-Sine the answer to efficient, accurate angle set-ups.

Available in 5 inch and 10 inch models.
Table sizes—
5" Model A— 5½ x 6
10" Model B— 7 x 12
10" Model C—10½ x 12

No longer necessary to obtain angles of rotation from graduations

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410 E. NINE MILE ROAD DETROIT, FERNDALE 20, MICH.

FABRICATION OF CATALIN, published by the Catalin Corporation, Dept. D, One Park Ave., New York 16, N. Y., supplies thorough, comprehensive information to users and prospective users of this advantageous, versatile plastic. The booklet's first part concerns physical properties of phenolics and their bearing on design and casting, especially with new techniques, including molding by the straight draw, split and cored mold methods. Another vital factor treated is cost analysis. The second part of the booklet is devoted to production by use of the lathe, screw machine, and abrasive automatic forming machine. Operations described cover drilling, threading, tapping, carving, grinding, sanding, shaping, cutting, sawing and both hand and tumble polishing. Finally discussed are fastening methods and devices, forming Catalin, applied decoration and die cutting, inlaying with catabond and dyeing Catalin. All the time-proved handling means, working tools, materials and methods applicable to Catalin in production are described and well illustrated in this 60-page booklet.
INFORM-A-GRAM KEY No. A11-Y

APPRENTICESHIP PROGRAM OF THE CANADIAN NATIONAL RAILWAYS: The apprenticeship program in operation in the many shops of the Canadian National Railways is described in detail in a 16-page, attractively illustrated pamphlet. This comprehensive explanation of a multi-trade program is reprinted from an address by A. H. Williams, General Supervisor of Apprentice Training for the railway system. The program, in its entirety, covers the training of apprentices for all-round skilled work as carmen, boilermakers, blacksmiths, electricians, machinists, molders, patternmakers, painters, pipefitters, sheet metal workers, and upholsterers. In view of the wide application of the training program, this description of its operation will be valuable information to those concerned with industrial training in the United States, not only in the transportation industry but in other industries as well. Copies of this booklet may be obtained by writing to Apprentice-Training Service, War Manpower Commission, Washington 25, D. C.

RECTOPLATERS, a new source of plating current, are described in a 4-page, illustrated folder released by the UDYLITE CORP., Dept. J, 1651 E. Grand Blvd., Detroit 11, Mich. The Udylite-Mallory Rectoplaters are produced in two standardized sizes, the Senior and the Junior. These compact, versatile units have proved their popularity by accumulating a total of five million rated amperes capacity in operation. Housed in a smartly designed, all steel, electric welded cabinet, they are attractively finished in baked, acid resistant, red, wrinkle enamel.
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A NEW AND SPECIAL SERVICE
TO OUR PRESENT AND PROSPECTIVE CUSTOMERS
Carbide Tipped SPECIAL PURPOSE
REAMERS
Built to your requirements!
• In addition to the manufacture of specialty designed reamers for the fine precision work required on small arms, radios, aircraft, precision instruments, etc., we now are prepared to incorporate this same high quality in CARBIDE TIPPED reamers. Each reamer we make—including CARBIDE TIPPED—is fashioned precisely for the work it is designed to do. Your requirements will be given immediate and expert attention.
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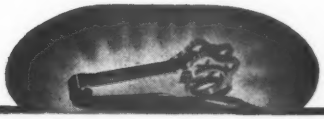
METAL CUTTING TOOLS AND MANUFACTURING CO.
11121 GRAND RIVER AVE. • DETROIT 4, MICH. • HOGARTH 9164-5

Brightboy TUFF-TEX
Tougher texture for finishing harder metals.

BRIGHTBOY FINE-TEX
Smoother, finer texture; for special finishes on softer metals in place of the coarser wheel.

BRIGHTBOY STANDARD
The favorite for burring, finishing, polishing the widest variety of metals and parts.



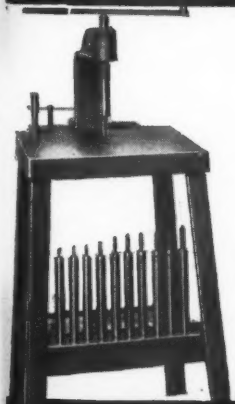
HAVE YOU EVER SEEN A Brightboy-FINISHED PART?

It will be a revelation. A Brightboy service representative will show you examples —suggest one-operation short cuts bridging the grind-to-buff gap. Ask your distributor for literature and prices on THREE BRIGHTBOY TEXTURES, for extensive work-adaptability on a wide variety of metals.

BRIGHTBOY INDUSTRIAL DIVISION
Weldon Roberts Rubber Co., Newark 7, N. J.

WELDON ROBERTS
Brightboy

A "PAIR" THAT'S HARD TO BEAT



They save time and labor in your tool room and turn out more accurate work.

• • • •

The Bay State Hand Tapper eliminates tap wrenches and minimizes tap breakage — is instantly ready, no set-up required. Long spindles reach down between projections. Simple, quick and easy to operate.

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The Bay State Handy Vise for all around accurate tool room use is made of hardened and ground steel—light in weight, yet sturdily made. A precision tool that grips and handles thick or thin pieces for tapping, drilling, reaming or jig boring.

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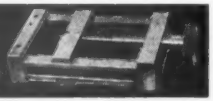
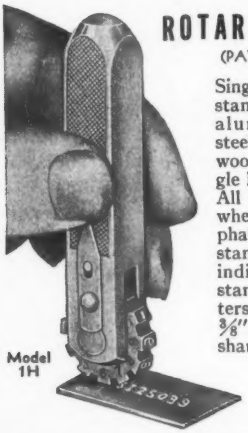
Write for descriptive circular.
Distributor inquiries invited for some sections.

BAY STATE TOOL & MACHINE CO.
DEPT. A 412 ALBANY STREET, SPRINGFIELD, MASSACHUSETTS



NUMBERALL



Model 1H

ROTARY STAMP

(PATENTED)

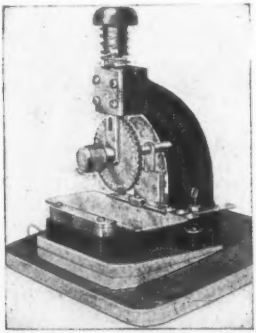
Single wheel, for stamping on brass, aluminum, soft steel, plastic and wood, with a single hammer blow. All figures on 1 wheel, entire alphabet on 2. One stamp replaces 12 individual, hand stamps. Characters from 1/16" to 3/8". Also with shank for press.

Bulletin TD1H.

NAME PLATE DETAIL PRESS

for stamping figures and letters into all kinds of name plates, key tags, and other small plates or tags.

The characters are carefully engraved and make clear-cut impressions. Characters 1/16", 3/32", 1/8", 5/32", 9/64". Dial size 3¼" diameter. Fully automatic spacer advances automatically one space with each impression. Net weight of machine 13 lbs. Moderately priced at $75.00. Write for Bulletin TD41A.



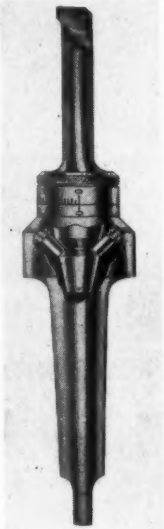
Model No. 41A

NUMBERALL STAMP & TOOL CO.

HUGUENOT PARK STATEN ISLAND 12, N. Y.

Dial Set Boring Tool

Micrometer adjustment of the Dial Set Boring Tool, made by the State Mfg. and Construction Co., Dept. TJ, 1954 Dixie Highway, Franklin, Ohio, is accomplished through an eccentric cone and socket. With the Vernier set at 0-0, the quill is exactly centered. As the Vernier is turned, the quill is thrown off center through graduations of .001" to a maximum of .050". The holder, consisting of a straight or tapered shank, socket and scale, accommodates a group of four or more inserts—the cone, vernier, quill and bit. The "A" kit, for example, comprises a holder and four inserts. Standard round bits are used, making replacements readily available although the manufacturer can furnish carbide, diamond and other types of bits. The bit, being held in the quill by a setscrew, can be extended to secure a secondary increase in the boring diameter. Combining the micrometer and bit adjustments will give the "A" kit the following range of cutting diameters: A-1 insert, 3/8" to 5/8"; A-2, 5/8" to 7/8"; A-3, 7/8" to 1 1/8"; A-4, 1 1/8" to 2". Thus by changing the holder inserts, a total range of 3/8" to 2" boring diameters is obtainable. Despite its fine precision of adjustment, the Dial Set Tool is amply rugged for heavy production work. Holders with disc bases for use on boring machines will be furnished, thus simplifying setup and saving time. State Dial Set Tools will bottom holes, bore to square shoulders, and accurately bore intermittent cuts. The manufacturer is prepared to supply Dial Set Tools in a wide variety of sizes and styles to meet user's requirements. Complete data will be given on request.



INFORM-A-GRAM KEY No. 138.5-Y

MAKE US PROVE IT!

Accuracy to 1/10,000 Inch

. . . plus Economy and Efficiency

You are invited to test Herman Granite Precision Surface Plates in your own shop at our expense. See for yourself the accuracy of these hard, smooth, warp proof surface plates cut from blocks of natural granite.

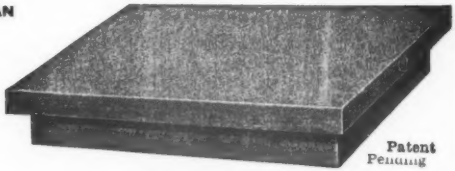
Unaffected by ordinary temperatures, rust or corrosion, Herman Granite Surface Plates have a long life. The surface is non-magnetic, does not become charged with abrasives and is therefore easily cleaned.

Herman Granite Surface Plates cost no more than ordinary cast iron ones; and they save their original cost over and over in savings on such tools as "Joe blocks" and height gauges.

Write today for specific data on a shop test.

A FEW FAMOUS USERS OF HERMAN GRANITE SURFACE PLATES

Allis-Chalmers	Ford
Chrysler Motors	International Harvester
Bausch & Lomb	General Electric
Curtiss Wright	Westinghouse Electric
Bendix	General Motors



Patent Pending

The Herman Stone Co.

Business Office, Harries Bldg., Dayton 2, Ohio

ENGINEERED TO THE JOB AND...

*Mastercased

TO GIVE UP TO

500%

LONGER LIFE

*MASTERCASTING . . . that's our improved super-heat-treating process which adds to the life of Masterform cutting tools . . . will multiply your production . . . will divide your costs per cut.

Want proof? Write, wire or phone for name of nearest-to-you factory representative . . . or without the slightest obligation, send specifications for estimates and complete information.

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Meet the Challenge

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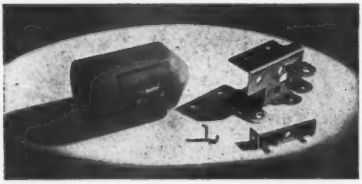
2540 IRVING PARK ROAD • CHICAGO 18, ILL.

OUTSTANDING ENGINEERING SERVICE AND CRAFTSMANSHIP

PRECISION PARTS

THE SHAPE OF THINGS TO COME



. . . pieces that will play a part in the peace.

There will be a new way of doing things in this post-war world of ours. New equipment has been developed that may change our way of life. And new manufacturing standards will call for faster, more economical production.

Thru years of producing for war, Ace has learned to meet these new standards. Here you will find the advantages of a single responsibility combined with the freedom to use ingenious methods. Here you will find modern equipment and managerial enthusiasm that is vital to fast, accurate work.

Whether you are thinking in terms of post-war production, or in terms of present capacity, it will pay you to check with Ace for small parts or assemblies involving stamping, machining, heat-treating, or grinding. Send blueprint, sketch, or samples for quotation.

ACE

TRADE MARK

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for Precision Parts

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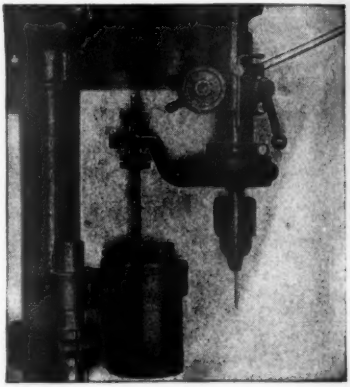
Copilot Drill Press Feed Regulator

This attachment for hand feed drill presses is a development of Special Devices Co., Dept. J, Berlin, Conn., for the initial production of good work by inexperienced, unskilled operators and at a maximum production rate. At the start of the operation it positively prevents violent contact of the drill with work



and the dropping of the spindle when drill breaks through is likewise eliminated. All backlash in the spindle feed mechanism is retarded which is a special safeguard for drilling plastics and thin materials. Free action for chip clearance is permitted and downward motion of the drill is checked before contact is again made with the hole bottom. Copilot is hydraulically operated, is self lubricating and its metering valve is automatically cleared to prevent clogging. Copilot drill press feed regulator is available as a special model, engineered for specific jobs and for providing variable regulating. For instance, if a cavity is to be drilled through, the drill will, with but little resistance, drop through and then be checked before making contact. The resistance can be made to vary in direct proportion to the amount of metal to be removed as a straight reamer, for instance, is fed through a tapered hole. Special models are priced according to the amount of engineering needed.

INFORM-A-GRAM KEY No. C8-Y

PEERLESS HYDRA-CUT

THE *Power Saw*
WITH
4-SIDED
Saw-Frame

Consolidated Vultee

THIS busy producer of aircraft cuts billets and large bar stock the fast, accurate way — with a POWER SAW!

SAWING off test samples for inspection purposes is number one method as approved by government engineers. SAWING does not heat and harden the metal at the face of the cut. The cool-running, straight-cutting blade removes as little as 1/16" of the precious metal. Peerless Saws cut accurately to the tolerances required in airplane production.

SAWING the Peerless way with the Four-Sided Saw-Frame and Backing-Plate Blade-Support is an interesting story — told in a simple, pictorial way in a new bulletin, number HC-50. A note on your letterhead will bring a copy to you.

Dealers in all principal cities
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PEERLESS
MACHINE COMPANY
RACINE · WISCONSIN

6 FEATURES YOU NEED IN A SMALL MILLER AND JIG BORER

The value of a little machine in a busy toolroom is measured by its adaptability to the continuous variety of small jobs . . . and the speed and accuracy of performing them. The Linley saves larger machines, earns profits two ways, because of these features:

1. **8 spindle speeds from 275 to 4250 r.p.m.**
2. **Quick set-up . . . easy changeover.**
3. **Direct micrometer setting, velvet feed.**
4. **Ample table size, 7" x 17½".**
5. **Small floor space, 18½" x 20".**
6. **Accurate, fast production.**

Ask us for quotation and delivery date . . . get your order in for present rush work and for your future civilian production.

BULLETIN ON REQUEST

LINLEY BROTHERS COMPANY
662 STATE STREET EXTENSION
BRIDGEPORT 1, CONN.

Improved After Cooling Method Dries Compressed Air More Thoroughly and Saves Cooling Water Costs

You protect all air tools, grinders, hammers, riveters—from water damage, from freezing and from loss of lubrication when the air is thoroughly dried in the NIAGARA Aero AFTER-COOLER. An *evaporative* cooler, it does not consume water, but repays its cost by eliminating water bills. It also provides controlled temperature for jacket and inter-cooler water with the Niagara "Balanced Wet Bulb" control.

Write for Bulletin 96 and 98

NIAGARA BLOWER COMPANY

Over 30 Years of Service in Industrial Air Engineering

Dept. TD-55, 6 East 45th Street, New York 17, N. Y.

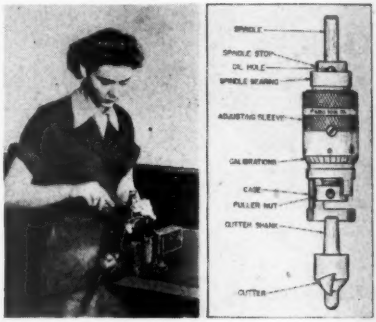
Field Engineering Offices in Principal Cities

NIAGARA

AIR ENGINEERING *EQUIPMENT*

Micrometer Stop Countersink

A new and simplified design of its widely used Micrometer Stop Countersink is announced by the Aero Tool Co., Dept. TJ, Burbank, California. A free factory reconditioning service for users of the countersink tool is offered by the company. The new design involves the elimination of the conventional split keeper, the addition of an oversize phosphor-bronze radial bearing and the installation of a simplified puller-nut to remove the cutter. Tests of the new design conclusively indicate a reduction of frictional heat to an absolute minimum as a result of the bronze bearing installation. The exclusive puller-nut permits removal of the cutter by a simple turn of the finger tips, completely overcoming the necessity of using a screwdriver or drift with the resultant danger of tool damage. These improvements in design so reduce the countersink break-down that repairs have become infrequent to a degree warranting a free reconditioning service at the factory without charge aside from the cost of parts used and the postage involved. The Aero Tool Company urges the many users of its countersink tool to take full advantage of the free service, thereby increasing the life of the tool, maintaining a higher standard of workmanship and reducing spare parts inventories. Complete details as to the new design may be obtained by requesting bulletin P-2 from the Aero Tool Company, Burbank, California.



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Whether for war or peacetime production the quality of your product is dependent upon the use of reliable controls.

MASTER GAUGES are recognized by the leaders in the industrial field as being instruments of exceptional durability and precision.

THREAD PLUGS **PLAIN RINGS** **PROFILE** **JIGS, DIES**
THREAD RINGS **SNAP** **BUILD-UP** **AND FIXTURES**
PLAIN PLUGS **FLUSH PIN** **THREAD CONCENTRICITY**

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DETROIT 21, MICHIGAN
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New THREAD PICK-UP PROJECTOR INCREASES GRINDER PRODUCTIVITY AS MUCH AS 50% . . . SOMETIMES MORE!

- Reduces grinding time
- Wheel and Diamond Life greatly prolonged
- Salvages threaded parts oversize .0003 or more
- Stock removed equally from both flanks
- Beginners can use expertly — quickly

The Thread Pick-up Projector is an optical device for setting the driving dog on pre-threaded work. Allows grinding wheel to enter trough of thread to remove finishing stock from both flanks accurately and without adjustment. Lead is picked up while previous piece is being ground — no time is lost. Viewing screen enlarges thread for quick, accurate check of root depth and angle. Picks up A. N., Acme and Whitworth threads. Operates in conjunction with any thread grinder.

Write for ***BULLETIN*** *No. 441 today!*

ACME INDUSTRIAL CO.
(SCIENTIFIC DIVISION)

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HIGH PRODUCTION
AT LOW COST

REG. U.S. PAT. OF.
HY-PRO
TAPS

By threading more holes per tap you can increase your production and lower tapping operation costs with HY-PRO Ground Thread Taps.

These high production taps are scientifically produced to give longer, more accurate service, and longer wear between sharpenings.

HY-PRO method of packaging makes crush-proof box a miniature tool box that fully protects taps and offers many time-saving advantages. Tension cover prevents spilling and injury to taps. Legible, informative labels are color-coded to save inventory time, and their position on cover prevents mixing of sizes when taps are returned to box.

PROMPT DELIVERY
Many special as well as standard Taps in stock

COMMERCIAL
PRECISION
SPECIAL
Ground Thread Taps

Write for Catalog on Company Letterhead

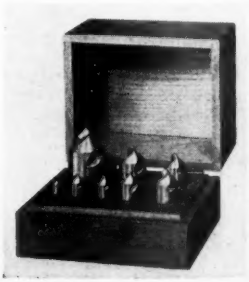
HY-PRO TOOL CO.
New Bedford, Mass., U.S.A.

Twin-Fluted Countersinks

Grobet File Company of America, Dept. TD, 421 Canal St., New York 13, New York, has made an important addition to their well-known line of chatterless countersinks. These twin-fluted countersinks have been designed for cut-

ting aluminum, magnesium, steel, plastics, plywood, etc. They impart a very smooth micro-inch finish and also are adaptable for coarser work such as brake linings. They are made of high speed steel, ground after hardening, and meet the exacting Grobet standards of accuracy as precision tools. They are ground to close tolerances and are fast cutting. There are eight twin-fluted countersinks to a set, giving a full range of six sizes with duplicates in two sizes. Each Grobet sink is guaranteed against chattermarks. A perfect chamfer can be made with these quality tools, free from ridges or chattermarks and accurately uniform in all cases. They come in a

(TO PAGE 184—PLEASE)



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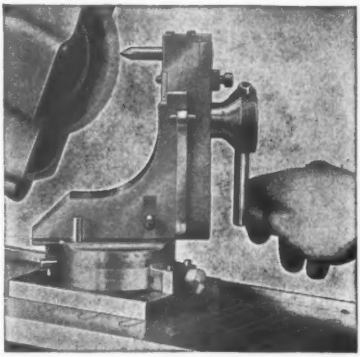
Fluid-motion

for modern form-dressing

ONE SETTING
HANDLE
CONTINUOUS MOTION

The J & S Model "E" Radii and Angle Dresser in the new "Fluid-motion" series is one of the finest precision dressing instruments procurable—regardless of cost.



FEATURES

Fluid-motion dressing
.0001" accuracy
Automatic centering
14" wheel capacity
Large range yet compact
Chatterless and dustproof

J. & S. TOOL CO.

477 MAIN ST. E. ORANGE 4, N. J.

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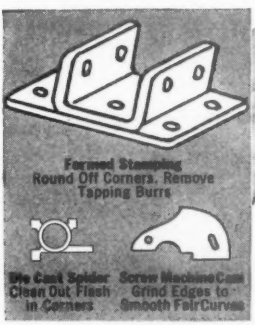
18 WAYS TO SAVE TIME & MONEY *with the* MEAD *Industrial Burring Machine*

New circular explains, illustrates 18 ways in which the Mead Industrial Burring Machine saves time and money—also contains special Grit Guide. Every industrial plant needs this "Jack-Of-All-Trades" machine. Your burring can be done in "free time"—install these machines by every machine tool which leaves burrs. Grinds, finishes both outside and inside cut-out openings. Immediate delivery in most cases. Write for the informative Money-Saving circular now.


Formed Stamping
Round Off Corners, Remove Tapping Burrs
Die Cast Spider
Clean Out Flash in Corners
Screw Machine Cam
Grind Edges to Smooth Fair Curves

For METAL - PLASTIC - WOOD

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MEAD Specialties Co.

4114 North Knox Avenue
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CHICAGO 41, ILL.

CADILLAC

GLASS
SURFACE
PLATE

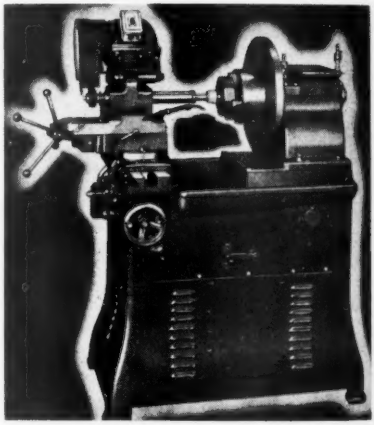
The
TRANSPARENT PLATE
with the
HIGHLY POLISHED SURFACE

Cadillac Glass Surface Plates have given uniform satisfaction in hundreds of plants. Produced in sizes from 8"x 8" to 18"x 24" and in accuracies from .0002 to .0005. Prices range from $11.00 to $90.00. Comes packed in individual box, top of which forms a protecting cover. Drop us a line for further data.

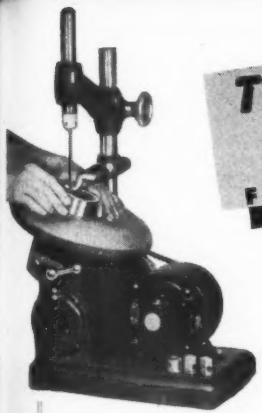
CADILLAC
GLASS COMPANY
900 West Cermak Road
CHICAGO 8 ILLINOIS

Lempco Combination Grinder

The new Model-ACX combination grinding machine for internal and external work is made by Lempco Products, Inc., Dept. TD, 5713 Dunham Rd., Bedford, Ohio. The machine will swing work up to 18" dia. and has a work length capacity of 8". One construction feature is the provision for mounting a tool holder for facing, turning and boring operations. The work head is driven by a ½ hp motor through a reduction gearbox which is chain connected to the



work spindle. The two reversible spindle speeds are 80 and 130 rpm. The spindle is mounted on bronze radial bearings with a ball thrust bearing and carries a No. 6 Lempco taper and mounts an 18" face-plate on which chucks are held by a drawbar extending through the spindle. The wheel head is equipped with a 2 hp motor with V belt connection to the ball bearing spindle giving speeds of 6,000 and 12,000 rpm and, in line with the spindle, carries a 1⅞" by 14" tool holder bar. This bar is retractable so finish grinding can follow machining without cutter removal. The head is equipped with both screw and rack-and-pinion hand feed; and also power cross feed of .02" per work spindle revolution. The compound is graduated a full 360 degrees. Available to specification is a sizing device that can be set for long-run work duplication.
INFORM-A-GRAM KEY No. 540-Y



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FILES . . . SAWS . . . STONES

Sawing

Stoning

ILLINOIS DIE FILING MACHINE

An accurate, smoothly-operating machine that files, saws and stones the most intricate die shapes . . . eliminates tedious hand operations . . . reduces costs. It is quality-built for long, trouble-free service . . . hardened and ground shafts running in bronze bushings minimize wear. The holding chuck and clamping device provide perfect file alignment.

Write for descriptive literature.

ILLINOIS TOOL WORKS

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MANUFACTURERS OF METAL CUTTING TOOLS AND SHAKEPROOF PRODUCTS

"Inside Dope" on this Efficient Tapping Head

Cross section of Tru-Grip Tap Holder showing positive drive to tap.

Here's the inside story of why Procunier Tapping Heads assure greater accuracy at high speeds—with less tap breakage. The tap is driven by a double-cone, cork-faced, friction clutch which engages the conical surfaces of the drive and reverse shells with a velvet-smooth "cushioned" action. The tap driving power is automatically regulated by pressure applied to the friction clutch through the drill press spindle. Operators can quickly detect dull or loaded taps by the "feel" or pressure on the clutch required to drive them, and needless tap breakage is avoided. Bottom tapping is readily accomplished, since the clutch instantly slips should the tap strike bottom or stick due to tap loading. Strain and wear are minimized and torsion is eliminated through the three-point balanced heat treated gear reversing mechanism, which distributes the pull through three intermediate gears. Reverse speed is twice the forward speed. The chuck spindle is supported at both ends which assures true operation of the spindle and avoids any possible wobble in the tap. The tap idles in the tapping direction—not in the "backing out" direction. Results: longer tap life and increased accuracy.

PROCUNIER SAFETY CHUCK CO.

12-14 S. Clinton Street
Chicago, Ill.

SEND ME BULLETINS ON

- ☐ High Speed Tapping Heads
- ☐ Tru-Grip Tap Holders
- ☐ Universal Tapping Machines

Name.....

Address.....

Acro needle eye

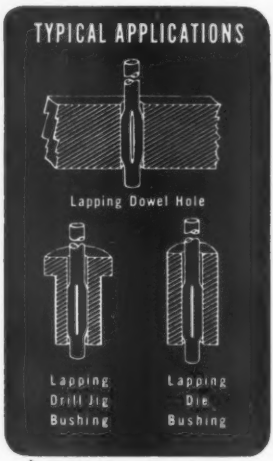
LAPS

are available in

17 sizes

.032" up to .250"

Prevent *bell-mouthing* and speed the finishing of small holes with the best laps known to industry . . . Acro Needle Eye Laps. Choose your size requirements from description below and send your order today.



LAP SIZES AND PRICES

.032, .036, .040, .046, .054—$1.20 Doz., $13.65 Gross

.062, .070, .079, .090, .104, .120, .135, .155—$1.50 Doz., $16.95 Gross.

.1718, .1875—$1.80 Doz., $20.50 Gross.

.2187, .250—$2.20 Doz., $25.10 Gross.

Working Assortment—1 Doz. each of 17 sizes from .032" to .250"—$24.75.

Sample Assortment—1 each of 17 sizes—$2.75.

Expanders included with each shipment.

Order Now—for Immediate Shipment

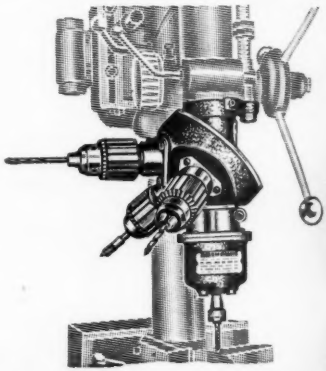
STOCKED BY LEADING JOBBERS EVERYWHERE

ACRO TOOL & DIE WORKS

4556 BROADWAY, CHICAGO 40, ILL.

Quadtapper, Tapping Head

A new tapping unit, designed to attach only to the Quadrill turret attachment for drill presses, has recently been announced by the Chicago Drillet Corporation, Dept. TD, 919 North Michigan Ave., Chicago 11, Illinois. The new unit, which is sold under the trade name Quadtapper, is a precision built, sturdy, high speed, self reversing tapping attachment having a ¼" capacity. It is



interchangeable with any of the four spindle assemblies of the Quadrill, and may be mounted in any one of the four positions. Strain and wear is minimized and torsion eliminated because of the three point, balanced, heat treated, gear reversing mechanism which distributes the drive through three intermediate gears. The backing out speed is twice as great as the tapping speed. The tap idles in tapping direction, instead of in the backing out direction, to insure longer tap life and highest accuracy. According to the manufacturer, the Quadrill plus Quadtapper combination makes drilling and tapping almost simultaneous operations. Upon written request, further information is available from the makers of these products.

INFORM-A-GRAM KEY No. B34-Y

★

The men and women of Detrola Radio Div., International Detrola Corp., have been notified that they will receive the Army-Navy award "as a symbol of your great contribution to Victory in this war for human liberty."

CRITERION *Boring Heads*

Original Accuracy *Maintained*

Noted for maintaining original accuracy over a longer period. Criterion Heads are smooth, compact, rigid. Parts subject to wear are hardened. Lead screw is hardened tool steel, with threads ground from solid after hardening. All heads have large, graduated dial. Large offset adjustment eliminates need for offset boring bars. Two sizes: 1½" and 3". ½" and 1" bar capacity. Shanks are interchangeable, enabling operator to use head on different machines. Ideally adapted for slide boring tool holder on small turret lathes. Ask your dealer or order direct. Request free literature.

CRITERION MACHINE WORKS
BEVERLY HILLS, CALIFORNIA

If you want
PROMPT DELIVERY
Phone or Write

BONE

Specialists in
LAMINATION DIES
PLASTIC DIES
All Types of PRECISION DIE, TOOL AND GAUGE WORK

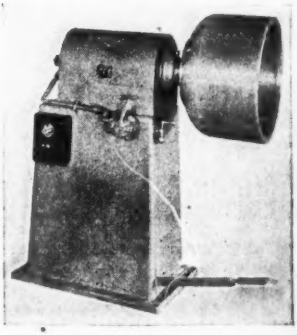
DESIGNERS AND BUILDERS— NO JOB TOO DIFFICULT

Phone Sales Manager: Hogarth 9458 Detroit

BONE TOOL & GAUGE CO.
9910 Freeland Avenue Detroit 27, Michigan

Schauer Vacuum Chucking Speed Lathe

The VA3BC-V Speed Lathe, with variable speeds and vacuum holding fixtures is a new heavy-duty lathe made by the Schauer Machine Co., Dept. DJ, 2043 Reading Rd., Cincinnati, Ohio. It provides a unique and advanced method of polishing and finishing, with an unequalled uniformity of lustre, such products as cooking utensils, bowls, kettles, reflectors and similarly shaped articles. With this machine the part is revolved instead of being brought up against a revolving abrasive or polishing wheel. The part is held in the fixture by vacuum. The machine is capable of handling a wide size range of vacuum holding fixtures, each designed for the particular work it is to hold. The vacuum



holding fixture will not mar or distort the part as mechanical holding fixtures might. This lathe contributes to a high production rate because of its continuously operating motor and its ease of spindle control. A single foot pedal controls the clutch and large, disc-type brake. The motor is coupled to the work spindle through a Twin-Disc assembly and a Reeves variable spindle drive. Available speeds are variable from a minimum of 100 rpm to a maximum of 4800 rpm in ratios of either 6 to 1 or 12 to 1.

INFORM-A-GRAM KEY No. 129-Y

★

(CONTINUED FROM PAGE 178)

durably hinged, polished wood box with an individual pocket for each size and with proper care will give good service for an exceptionally long time. The standard set is made with 82-degree included angle, but Grobet twin-fluted countersinks also may be obtained with 90 and 60-degree included angle. Send for Grobet bulletin No. 451.

INFORM-A-GRAM KEY No. 705-Y

ANGLES
TO A MINUTE...
IN A MINUTE!
THE BEMISINE
SPEEDS UP AND SIMPLIFIES SETTING ANY ANGLE FROM 0 TO 90° —USING ONLY A 2" MICROMETER!* IT HOLDS THE WORK! FASTER THAN A SINE BAR OR PROTRACTOR! CONVERTS SET-UP TIME TO PRODUCTION TIME ON SURFACE GRINDERS, JIG BORERS AND MILLERS.
*Also Used With Standard Gage Blocks
NICHOLS-MORRIS CORPORATION
44 CHURCH STREET, NEW YORK 7, N.Y.

Clark

LEVER-LOCK BORING BARS

1. Sizes down to 3/16" diameter. **2.** Eliminates use of solid forged bars. **3.** Tool bit held on extreme end of boring bars. **4.** Full clearance to bore or thread to bottom of blind hole. **5.** Each bar has 15° holding channel in one end, right angle channel in other. **6.** One precision ground thread tool bit and one boring bit furnished with each bar. **7.** Complete set of 4 packed in sturdy wood box $8.70.

SPECIFICATIONS			
Dimensions of Boring Bars		Size of Cutters Round	Used with Clark Tool Holders Nos.
Diam.	Lgth.		
3/16	5	3/32	P60R, P61R
1/4	6	1/8	P60R, P61R, P62R
3/8	7	3/16	P61R, P62R, P64R
1/2	8	1/4	P62R, P64R

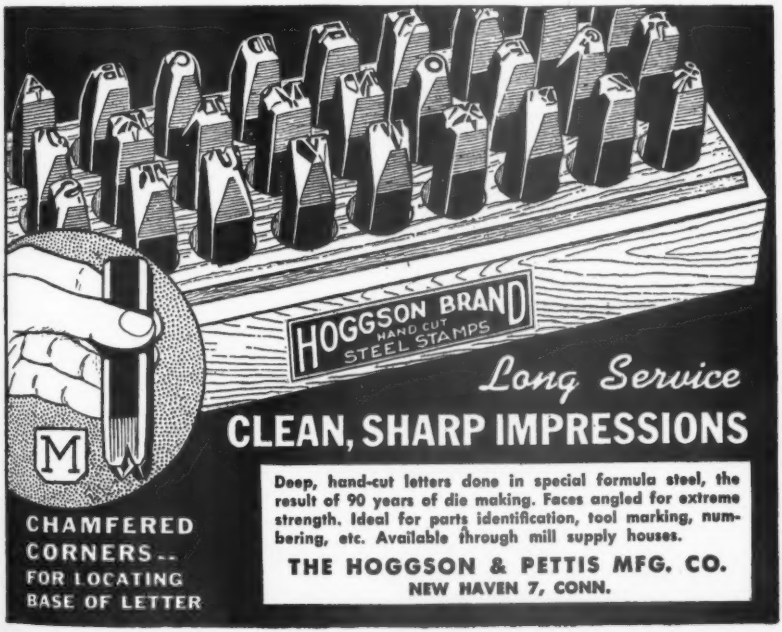
FOR COMPLETE INFORMATION, CALL YOUR CLARK CUTTER JOBBER TODAY, or write for catalog TDJ-5-LLB

The exclusive Clark Lever-Lock feature securely grips the tool bit.

CLARK CUTTERS

Robert H. Clark Company

9330 SANTA MONICA BOULEVARD BEVERLY HILLS, CALIFORNIA



Long Service

CLEAN, SHARP IMPRESSIONS

CHAMFERED CORNERS -- FOR LOCATING BASE OF LETTER

Deep, hand-cut letters done in special formula steel, the result of 90 years of die making. Faces angled for extreme strength. Ideal for parts identification, tool marking, numbering, etc. Available through mill supply houses.

THE HOGGSON & PETTIS MFG. CO.
NEW HAVEN 7, CONN.

"10 MILLION PIECES

without a single rejection, thanks to MICRO-CHEK"

-says LUCAS SCREW PRODUCTS, Inc.

Priced from $9.75

Users of nearly 100 Trico MICRO-CHEKS, Lucas Screw Products, Inc., of Rochester, N. Y., reports:

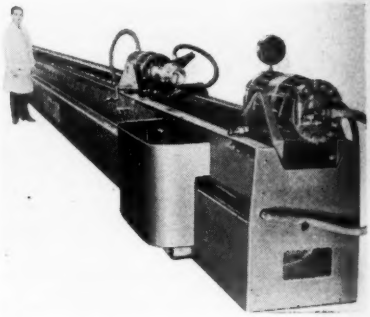
"We find them to be a low-cost economical way of controlling accuracy on high precision automatic screw machine production. In numerous cases, we have reduced our gage cost from 50 to 75 per cent. They check close tolerances . . . eliminating fatigue and uncertainty upon the operator. Their simplicity enables us to use inexperienced help in final inspection. In one case we produced 10,000,000 pieces without a single rejection from the prime contractor."

Speed inspections in YOUR plant with TRICO MICRO-CHEK Comparator Gages, now in use in more than 3600 war plants . . . on machines, on inspection lines. Send for booklet which illustrates many applications.

TRICO MICRO-CHEK
TRICO PRODUCTS CORP.
40 Trico Square, Buffalo 3, N. Y.

Hydraulic Stretch Leveling Table

A new hydraulic stretch-leveling table, especially developed for permanently straightening and leveling long narrow metal sections that are twisted, bent or otherwise distorted after rolling or heat treatment, is announced by Hufford Machine Works, Inc., Dept. TJ, 207 N. Broadway, Rodondo Beach, Calif. It is particularly useful for straightening



rolled and extruded metal for aircraft fuselage stringers, railroad or structural members, bus body parts, boat frames and similar structural parts. The machine handles sections up to 40 ft. in length, of any shape and many materials. It straightens the stock by establishing a "set" in the metal through a predetermined, slight stretching, and can be used with a die for stretch-forming the workpiece to contours up to 30 degrees. The Hufford Stretch-Leveling table is simply operated, for all controls are maintained at a central control panel containing valve levers to actuate the tension cylinder piston rods and a variable sensitive hydraulic control which permits manual regulation of the tension applied to the work. The adjustable tension cylinder can also be operated by remote controls on the assembly. Complex extruded or rolled shapes can be easily handled and accurate control maintained over applied tension by means of an automatic stop for definite percentage of stretch so that uniform dimensional and physical properties are assured.

INFORM-A-GRAM KEY No. 936-Y

60% More Parts

WITH A Barker

WRENCHLESS CHUCK

Production went up from 75 to 120 parts per hour when the Atlantic Brass Works installed a Barker Two-Jaw Wrenchless Chuck. The part is a bronze plug for a ground key valve. The operations are center, face, and box mill. The lathe is not stopped to set or remove the work.

This step-up in production is typical of new output records being made by users of Barker Wrenchless Chucks and Vises—more parts per hour, lower cost, and less operator fatigue.

You, too, can have continuous and generous dividends by installing Barker Wrenchless Holding Devices. Write today for full information.

Barker Two-Jaw Chuck

Barker Three-Jaw Chuck

Barker Two-Jaw Vise

Barker Three-Jaw Vise

THOMAS HOIST CO.

Chuck Division

20 So. Hoyne Ave., Chicago 12, Ill.

Use Them Over and Over

DE-STA-CO ARBOR SPACERS

Measured by the number of times De-Sta-Co Spacers can be used, they are the lowest in cost of any spacers you can buy.

Made of metal, they are not affected by oil or heat.

Use for quick set-up of milling machine cutters and wherever low cost, accurate spacing is needed. Stock sizes .001″ to .125″ thick. Specials, any length, cut from bar stock, ground to decimal.

TRIAL ASSORTMENT—enough for average use on one machine sent for $1.00. Give arbor size.

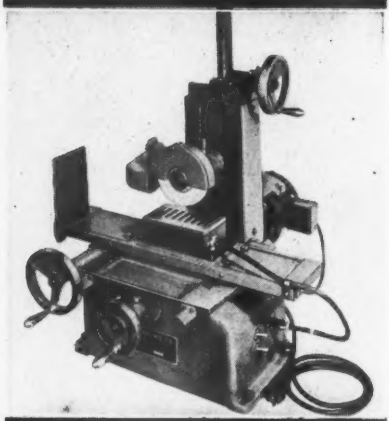
Size and price list sent FREE!

DETROIT STAMPING CO.

Established Over 25 Years

344 Midland Ave • Detroit 3, Mich.

SANFORD



High-Speed **BENCH**
SURFACE GRINDER

ACCURATE WITHIN .0001

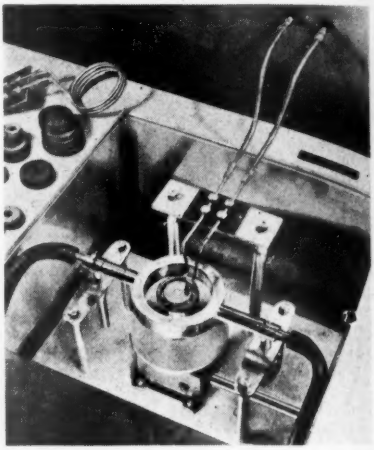
A sensitive machine built to rigid standards of accuracy and workmanship specially designed *"For the job that fits in your palm."*

WRITE FOR BULLETIN
Available On M. R. O. Certifications

SANFORD MFG. CO.
1279-81 Springfield Ave.
Irvington II, N. J.

Induction Heating Unit

A new roto-heating and quenching unit for induction heating of gears and pinions is produced by Lepel High Frequency Laboratories, Dept. TD, 39 West 60th St., New York 23, N. Y. High frequency induction heating is generally recognized as a superior method of hard-



ening gears and pinions. It permits localized hardening confined to the tooth wearing surfaces, retaining the full toughness and ductility of the steel in untreated areas. In the short time required to bring the part to quenching temperature, practically no grain growth or surface decarburization takes place. The result is a super-hard, long wearing surface. Hardening time is reduced to seconds, and as there is practically no distortion or scaling, little or no finishing is required after quenching. The roto-heating and quenching unit has been developed to help secure for users of this process the fullest benefits from its use. The device causes the part to revolve at a predetermined speed within the load coil during the automatically controlled heating and quenching cycles. The resultant degree of uniformity, never hitherto achieved by any hardening process, creates a new standard of quality for such parts.

INFORM-A-GRAM KEY No. 999-Y

BURKE

MILLING MACHINES

No. 4 Motor Driven MILLING MACHINE
Mounted on Cabinet Column

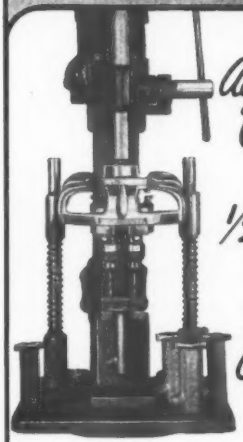
Burke motor driven milling machines Nos. 1, 2, 3, and 4 are specially suited for handling small, difficult work on a production basis.

Write for complete information.

Burke Machine Tool Co.
301 E. 16th St. -:- Conneaut, Ohio

TWO SPINDLE *Adjustable* DRILL HEADS

Drill Two Holes At Once



✓ *Adjustable Centers from 1/2" to 6"*

✓ *Drill Capacity 0" to 5/8"*

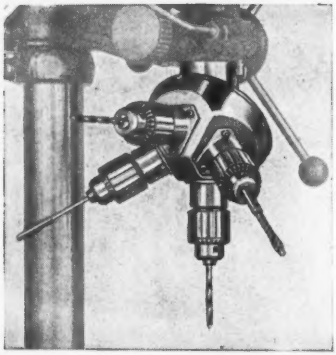
Sleeve and overarm types ... in several sizes. Will double output of any single spindle drill press.

Quickly adjusted to desired drill centers from 1/2" to 6".

Send for bulletin

LINDERME
MACHINE & TOOL CO., INC.
12250 COYLE AVENUE
DETROIT 27, MICHIGAN

THE NEW
QUADRILL
TURRET ATTACHMENT FOR DRILL PRESSES!



4 DRILL PRESSES IN 1

- Rigid Alignment — Strictly Accurate
- Easily Attaches to Quill of Press
- Quick Indexing
- Finger-Tip Control Changes Positions

Multiply drill press production 4 times with the new QUADRILL. Attaches directly to the quill of most drill presses. Three drills remain stationary for safety while only drill in work position operates. Actually converts a single drill press into four. Does away with moving work from press to press and reduces frequent changes of tools. Saves floor space. All this and more. Write for complete details and prices today.

Sold on Positive Money-Back Guarantee

CHICAGO
DRILLET
CORPORATION
919 N. MICHIGAN AVE.,
CHICAGO 11, ILLINOIS

Sheffield Internal Measuring Instrument

For maintaining high precision dimensions, the new Model N-5 Internal Measuring Instrument is announced by the Sheffield Corp., Dept. TD, Dayton 1, Ohio. This comparator type gage has an electric gaging head, the Electrigage, which is an improved, 2500 to 1, amplifying device. Electrical magnification actuates the indicator hand for accurate reading. An automatic stabilizer prevents ordinary voltage variations from affecting reading accuracy. Precision blocks or masters are used for setting up the instrument. A limit switch device, which operates two red signal lights, assists in the machine setup and proper positioning of the workpiece. The inside dimension gaging range includes a minimum of from .370" to a maximum of 12". The surface plate is adjustable vertically, giving a gaging range from the surface plate to the center of the diamond points of from ⅞" to 1½". Therefore, it is possible to explore a 3" deep hole throughout for taper, bell mouth and out of round conditions. The capacity is sufficient to check an A. G. D. ring of the largest size. Special gaging arms are available to adapt the instrument for checking holes down to and including .240" in diameter, with maximum gaging depth of 2". The balanced type linear scale has a total range of .0012". The distance between the smallest graduations representing .00005 is approximately ⅛", thus simplifying readings to .000025 or less.

INFORM-A-GRAM KEY No. 24-Y

BUY WITH CONFIDENCE

A directory of products, listing for ready reference the names of their manufacturers and dealers. Complete information about any product may be had upon request made to the firm listed or to us. Due to the critical paper shortage, it has become necessary to run this section in two issues. The first half appeared in April TDJ.

GAGES—Grinding
Acro Tool & Die Works, 4556 Broadway, Chicago 40, Ill.

GAGES—Thread Plug & Ring
Cadillac Gage Co., 20316 Hoover Rd., Detroit 5, Mich.
Parfex Gage & Tool Co., 3604 Gaylord Ave., Detroit 12, Mich.

GAGES—Tool Setting
Bartelt Engineering Co., 1212 Partridge Ave., Beloit, Wis.
Tools & Gages, Inc., 3112 E. 63rd St., Cleveland 4, O.

GEARS
Hartford Special Machinery Co., The, 231 Homestead Ave., Hartford, Conn.
Taylor Machine Co., 1917 E. 61st St., Cleveland 3, O.

GRADUATORS
Gorton Machine Co., George, 1201 Racine St., Racine, Wis.

GRINDER TOOLS
Norton Co., Worcester 6, Mass.
Clark Co., Robert H., 9330 Santa Monica Blvd., Beverly Hills, Calif.

GRINDERS—Abrasive Band & Disc
Walls Sales Corp., 97 Warren St., New York, N. Y.

GRINDERS—Attachments
Cincinnati Grinders, Inc., Cincinnati, O.

GRINDERS—Automatic Cycle
Cincinnati Grinders, Inc., Cincinnati, O.

GRINDERS—Bench & Pedestal
Delta Mfg. Co., The, 612A E. Vienna Ave., Milwaukee 1, Wis.
Sanford Mfg. Co., 1279-81 Springfield Ave., Irvington 11, N. J.
Standard Electrical Tool Co., The, Cincinnati 4, O.

GRINDERS—Carbide Tool
Delta Mfg. Co., The, 612A E. Vienna Ave., Milwaukee 1, Wis.
Gorton Machine Co., George, 1201 Racine St., Racine, Wis.
Hammond Machinery Builders, Inc., 1631 Douglas Ave., Kalamazoo 54, Mich.
Lee Co., K. O. Aberdeen, S. D.

GRINDERS—Centerless & Center Type
Cincinnati Grinders, Inc., Cincinnati, O.

GRINDERS—Chip Breaker
Delta Mfg. Co., The, 612A E. Vienna Ave., Milwaukee 1, Wis.
Lee Co., K. O. Aberdeen, S. D.

GRINDERS—Combination Twist Drill & Tap
Gallmeyer & Livingston Co., 304 Straight Ave., S. W., Grand Rapids 4, Mich.

GRINDERS—Cutter & Tool Attachments
Cincinnati Milling Machine Co., Cincinnati 9, O.

GRINDERS—Crankshaft
Lempco Products, Inc., 5713 Dunham Rd., Bedford, O.

GRINDERS—Cylindrical
Cincinnati Grinders, Inc., Cincinnati, O.
J & S Tool Co., 477 Main St., E. Orange 4, N. J.
Norton Co., Worcester 6, Mass.

GRINDERS—Die
Standard Electrical Tool Co., The, Cincinnati 4, O.

GRINDERS—Disc
Besly & Co., Charles H., 118-124 No. Clinton St., Chicago 6, Ill.
Lempco Products, Inc., 5713 Dunham Rd., Bedford, O.

GRINDERS—Engraving Cutter
Preis Engraving Machine Co., H. P., 155-159 Summit St., Newark, N. J.

GRINDERS—External
Standard Electrical Tool Co., The, Cincinnati 4, O.

GRINDERS—Face
Oliver Instrument Co., 1436 Maumee St., Adrian, Mich.

GRINDERS—General Purpose
Hammond Machinery Builders, Inc., 1631 Douglas Ave., Kalamazoo 54, Mich.

GRINDERS—Hand (See GRINDERS—Portable)

GRINDERS—Heavy Duty
Hammond Machinery Builders, Inc., 1631 Douglas Ave., Kalamazoo 54, Mich.

GRINDERS—Hydraulic
Cincinnati Grinders, Inc., Cincinnati, O.
Gallmeyer & Livingston Co., 304 Straight Ave., S.W., Grand Rapids 4, Mich.

GRINDERS—Internal
Abrasive Machine Tool Co., E. Providence 14, R. I.
Lempco Products, Inc., 5713 Dunham Rd., Bedford, O.
Rivett Lathe & Grinder, Inc., Brighton, Boston, Mass.
Sav-Way Industries, P. O. Box 117, Harper Sta., Detroit 13, Mich.
Standard Electrical Tool Co., The, Cincinnati 4, O.

GRINDERS—Plain, Center Type
Cincinnati Grinder, Inc., Cincinnati, O.

GRINDERS—Portable
Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago 7, Ill.
Dumore Co., The, Dept. TC-42, Racine, Wis.
Foredom Electric Co., 27 Park Pl., New York 7, N. Y.
Precise Products Corp., 1341 Clark St., Racine, Wis.

GRINDERS—Portable Pneumatic
M-B Products, 130 E. Larned St., Detroit 26, Mich.

GRINDERS—Precision for Contours
Baker Bros., Inc., Toledo 10, O.

GRINDERS—Profile
Boyar-Schultz Corp., 2112-C Walnut St., Chicago 12, Ill.

GRINDERS—Ring Wheel
Besly & Co., Charles H., 118-124 No. Clinton St., Chicago 6, Ill.

GRINDERS—Snagging
Standard Electrical Tool Co., The, Cincinnati 4, O.

GRINDERS—Stationary Pneumatic
M-B Products, 130 E. Larned St., Detroit 26, Mich.

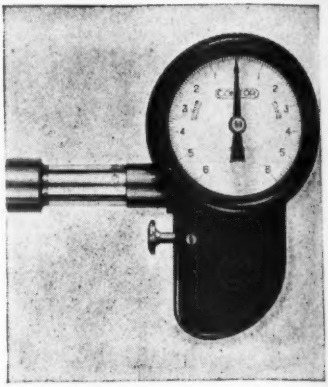
GRINDERS—Surface
Abrasive Machine Tool Co., East Providence 14, R. I.
Builders Iron Foundry, 23 Codding St., Providence 1, R. I.
Delta Mfg. Co., The, 612A E. Vienna Ave., Milwaukee 1, Wis.
Gallmeyer & Livingston Co., 304 Straight Ave., S.W., Grand Rapids 4, Mich.
Lempco Products, Inc., 5713 Dunham Rd., Bedford, O.
Norton Co., Worcester 6, Mass.
Sanford Mfg. Co., 1279-81 Springfield Ave., Irvington 11, N. J.

GRINDERS—Tap
Gallmeyer & Livingston Co., 304 Straight Ave., S.W., Grand Rapids 4, Mich.

GRINDERS—Tool Bit
Oliver Instrument Co., 1436 E. Maumee St., Adrian, Mich.

GRINDERS—Tool & Cutter
Boyar-Schultz Corp., 2112-C Walnut St., Chicago 12, Ill.
Cincinnati Milling Machine Co., Cincinnati 9, O.
Cleveland Tool Engineering Co., The, 1261H W. 4th St., Cleveland, O.

New Comtorplug Amplifier



This product of the Comtor Company, Dept. T, Waltham, Mass., is described in Bulletin 31.

The purpose of Comtorplug is to provide a highly accurate comparator gage for use where it is desired to produce identical holes in quantities. A Comtorplug gage consists of two parts: the Amplifier and the Expansion Plug, which lock together as a unit. With each size of Plug there is required a Reference Ring Gage. The same Amplifier can be used with all sizes of Expansion Plugs, and is instantly interchangeable.

The new model, designated as P-2, has a built-in shock-absorbing movement that protects the mechanism from damage by extreme or sudden force applied in operation. This is particularly advantageous where the gage is operated by relatively unskilled users. The original Comtorplug Amplifier was designed as a precision inspection check gage. During the war it has been widely used at machines and for routine bench inspection. The new shock-absorbing movement can be applied to existing P-1 models.

INFORM-A-GRAM KEY No. A3-Y

Douglas Machinery Co., Inc., 150 Broadway, New York 7, N. Y.
Gorton Machine Co., George, 1201 Racine St., Racine, Wis.
Kearney & Trecker Products Corp., Milwaukee 14, Wis.
Norton Co., Worcester 6, Mass.
Oliver Instrument Co., 1436 E. Maumee St., Adrian, Mich.
Production Machine Co., Dept. TJ, Greenfield, Mass.
Scherr Co., Inc., George, 128-B Lafayette St., New York 12, N. Y.

GRINDERS—Tool Post
Lempco Products, Inc., 5713 Dunham Rd., Bedford, O.
Standard Electrical Tool Co., The, Cincinnati 4, O.

GRINDERS—Twist Drill
Gallmeyer & Livingston Co., 804 Straight Ave., S.W., Grand Rapids 4, Mich.

GRINDERS—Universal
Cincinnati Grinders, Inc., Cincinnati, O.
Norton Co., Worcester 6, Mass.
Production Machine Co., Dept. TJ, Greenfield, Mass.
Rivett Lathe & Grinder, Inc., Brighton, Boston, Mass.

GRINDERS—Universal Tool & Cutter
Cincinnati Milling Machine Co., Cincinnati 9, O.
Douglas Machinery Co., Inc., 150 Broadway, New York 7, N. Y.
Gallmeyer & Livingston Co., 804 Straight Ave., S.W., Grand Rapids 4, Mich.
Lee Co., K. O. Aberdeen, S. D.

GRINDERS—Utility
M-B Prdoucts, 130-134 E. Larned St., Detroit 26, Mich.

GRINDERS—Vertical Spindle
Standard Electrical Tool Co., The, Cincinnati 4, O.

GRINDERS—Wet Tool
Standard Electrical Tool Co., The, Cincinnati 4, O.

GRINDING & LAPPING—Precision
Acme Industrial Co., 206 No. Laflin St., Chicago 7, Ill.
J & S Tool Co., 477 Main St., E. Orange 4, N. J.

GRINDING (Cylindrical) & POLISHING MACHINES
Hammond Machinery Builders, Inc., 1631 Douglas Ave., Kalamazoo 54, Mich.

GRINDING WHEELS
Carborundum Co., The, Niagara Falls, N. Y.
Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago 7, Ill.
DeSanno & Sons, A. P., 464 Wheatland St., Phoenixville, Pa.
Norton Co., Worcester 6, Mass.

GUIDE PINS
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.
Die Supply Co., 4751 Hough Ave., Cleveland, O.

HAMMERS—Board Drop
Chambersburg Engineering Co., Chambersburg, Pa.

HAMMERS—Rawhide
Chicago Rawhide Mfg. Co., 1280 Elston Ave., Chicago, Ill.

HAMMERS—Single & Double Frame Forgings
Chambersburg Engineering Co., Chambersburg, Pa.

HAMMERS—Soft Alloy
Industrial Products Suppliers, 106 Water St., New York 5, N. Y.

HAMMERS—Steam Drop
Chambersburg Engineering Co., Chambersburg, Pa.

HAMMERS—Steel Inspector
Cunningham Co., M. E., 104 Carson St., Pittsburgh 19, Pa.

HARDNESS TESTERS
Ames Co., B. C., Waltham, Mass.
Clark Instrument, Inc., 10200 Ford Rd., Dearborn, Mich.
Shore Instrument & Mfg. Co., Inc., The, 9025 Van Wyck Ave., Jamaica, N. Y.
Wilson Mechanical Instrument Co., Inc., 371 Concord Ave., New York 54, N. Y.

HEADS—Boring (See BORING HEADS

HEADS—Dividing
Cincinnati Milling Machine Co., Cincinnati 9, O.

HEADS—Milling
Gorton Machine Co., George, 1201 Racine St., Racine, Wis.

HOBBERS—Gear (See GEAR HOBBERS)

HOBS—Hook Checking Machine For
Detroit Tap & Tool Co., 8432 Butler St., Detroit 11, Mich.

HOBS—Thread
Detroit Tap & Tool Co., 8432 Butler St., Detroit 11, Mich.

HOBS—Tread Milling
U. S. Machine Tool Mfg. Corp., 100 So. 6th St., Clinton, Ind.

HOLDERS—Adjustable
Ford Motor Co., Johansson Div., Dearborn, Mich.

HOLDERS—Broach (SEE BROACH HOLDERS)

HOLDERS—Drill
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.
Ruanok Tool Works, 4840 North Ave., Chicago 39, Ill.

HOLDERS—Steel for Number
Cunningham Co., M. E., 104 Carson St., Pittsburgh 19, Pa.

HOLDERS—Tap
Procunier Safety Chuck Co., 12-14 So. Clinton St., Chicago, Ill.

HOLDERS—Tool
Acme Tool Co., 196 Church St., New York 13, N. Y.
Allison Tool & Engraving Co., 4621 Whittier Blvd., Los Angeles 22, Calif.
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.
Boyar-Schultz Corp., 2112-C Walnut St., Chicago 12, Ill.
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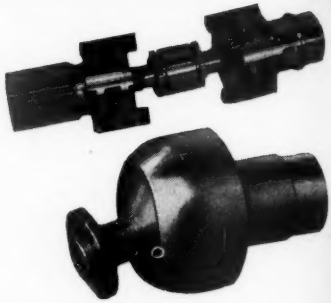

The two constant velocity universal joints here illustrated have been designed by The Gear Grinding Machine Co., Dept. TJ, 3901 Christopher, Detroit 11, Michigan. These high speed joints operate at speeds up to 9000 rpm between shafts subject to a maximum deviation from normal of 6 degrees. At all speeds and at all angles of deflection these joints deliver to the driven member the same constant speed of rotation as that provided by the driving member. Geargrind engineers are available to discuss the design of special constant velocity universal joints where proper ratios between speed and angularity are essential to satisfactory, trouble-free operation. A catalog covering constant velocity universal joints will be mailed on request.

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Wesson Products Co., Dept. TD-4, Ferndale, Mich.

HOLDING FIXTURE
Zagar Tool, Inc., 23881 Lakeland Blvd., Cleveland, O.

HONING—Contract
Enterprise Machine Parts Corp., The, 2731 Jerome Ave., Detroit, Mich.

HONING MACHINES—Cylindrical
Automotive Maintenance Machinery Co., (Ammco), 2100 Commonwealth Ave., No. Chicago, Ill.

HONING MACHINES—Horizontal
Enterprise Machine Parts Corp., The, 2731 Jerome Ave., Detroit, Mich.
Sunnen Products Co., 7947 Manchester Ave., St. Louis 17, Mo.

HYDRAULIC MACHINERY
Peerless Machine Co., Dept. TD 545, Racine, Wis.

IDENTIFICATION COLORS
Dykem Co., The, 2201 No. 11th St., St. Louis, Mo.

INDEX BASES
Allison Tool & Engineering Co., 4031 Whittier Blvd., Los Angeles 23, Calif.

INDEXING DEVICES
Hartford Special Machinery Co., The, 261 Homestead Ave., Hartford, Conn.

INDEXING FIXTURES
Zagar Tool, Inc., 23881 Lakeland Blvd., Cleveland, O.

INDEXING HEAD—Universal
Cleveland Tool Engineering Co., The, 1261H W. 4th St., Cleveland, O.

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Lufkin Rule Co., Saginaw, Mich.

INDICATORS—Dial
Ames Co., B. C., Waltham, Mass.
Federal Products Corp., 1244 Eddy St., Providence 1, R. I.
Scherr Co., Inc., George, 128-B Lafayette St., New York 12, N. Y.

INSPECTION DEVICES
Bartelt Engineering Co., 1212 Partridge Ave., Beloit, Wis.

IRONS—Angle
Challenge Machinery Co., The, Grand Haven, Mich.

JACKS—Machine
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

Enterprise Machine Parts Corp., The, 2731 Jerome Ave., Detroit, Mich.

JIG BORERS
DeVlieg Machine Co., 450 Fair Ave., Ferndale 20, Mich.
Gorton Machine Co., George, 1201 Racine St., Racine, Wis.
Kearney & Trecker Products Corp., Milwaukee 14, Wis.
Moore Special Tool Co., Inc., 726 Union Ave., Bridgeport 7, Conn.

JIG GRINDERS
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Bunell Machine & Tool Co., The, 1601 E. 23rd St., Cleveland 14, O.
Electrix Corp., 156 Middle St., Pawtucket, R. I.
Enterprise Machine Parts Corp., The, 2731 Jerome Ave., Detroit, Mich.
Federal Tool Corp., 400 No. Leavitt St., Chicago 12, Ill.
McKinney Tool & Mfg. Co., The, 1673 Arabella Rd., Cleveland 12, O.
Merz Engineering Co., Indianapolis 7, Ind.
Moore Special Tool Co., Inc., 726 Union Ave., Bridgeport 7, Conn.
National Machine Tool Co., 1536 Clark St., Racine, Wis.
Rockford Die & Tool Works, Inc., 1816 17th Ave., Rockford, Ill.
Star Machine & Tool Co., 9320 Woodland Ave., Cleveland, O.

KEY SETS
Holo-Krome Screw Corp., The, Hartford 10, Conn.

KEYS—Socket Screw
Die Supply Co., 4751 Hough Ave., Cleveland, O.
Holo-Krome Screw Corp., The, Hartford 10, Conn.

KNEES—Toolmakers'
Acme Tool Co., 196 Church St., New York 13, N. Y.

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Brand Tool & Supply Co., Flower at Washington, Los Angeles 15, Calif.

KNURLS—Steel
Mercury Metal Die & Letter Co., 546 E. 16th St., Los Angeles 15, Calif.

LAPPING COMPOUND
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Carborundum Co., The, Niagara Falls, N. Y.

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Boyar-Schultz Corp., 2112C Walnut St., Chicago 12, Ill.

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General Die-Stamping-Tool Co., 262-272 Mott St., New York 13, N. Y.
South Bend Lathe Works, 432 E. Madison St., South Bend 22, Ind.

LATHE CENTERS
Kennametals, Inc., 550 Lloyd Ave., Latrobe, Pa.

LATHE DOGS
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

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Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

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Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

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Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.
South Bend Lathe Works, 432 E. Madison St., South Bend 22, Ind.

LATHES—Back-Geared
Logan Engineering Co., Chicago 30, Ill.

LATHES—Ball Bearing
Logan Engineering Co., Chicago 30, Ill.

LATHES—Bench
Logan Engineering Co., Chicago 30, Ill.
Rivett Lathe & Grinder, Inc., Brighton, Boston, Mass.
South Bend Lathe Works, 432 E. Madison St., South Bend 22, Ind.

LATHES—Engine
South Bend Lathe Works, 432 E. Madison St., South Bend 22, Ind.

LATHES—Magnetic Polishing
Lima Electric Motor Co., The, 304 Findlay Rd., Lima, O.

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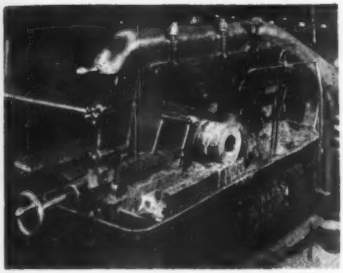

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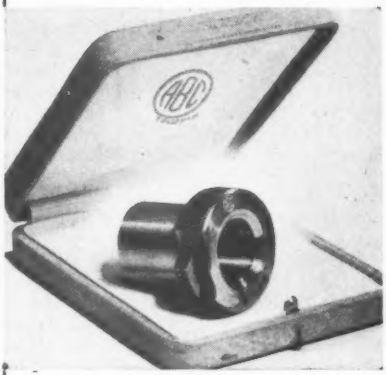

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The Chicago Association of Commerce and the University of Chicago have announced a forum on aviation to explore the problems and prospects of the aircraft and air transport industries and the possibilities for Chicago's development in aviation.

The forum, consisting of ten two-hour meetings, will be held each Tuesday evening at the La Salle Hotel beginning April 10th. An important phase of the problems involved in the development of aviation will be discussed by a national authority on the subject at each meeting. This will be followed by a question and answer period.

Mr. Leverett S. Lyon, chief executive officer of the Chicago Association of Commerce, in discussing the forum said, "Chicago, as the world's greatest transportation center, has a vital interest in every form of transportation development, both in terms of the manufacture of equipment and in terms of transport. An analysis of the various phases of the aviation industry by the most competent men in America will provide an understanding of the field and will contribute greatly to the specific decisions which Chicago businessmen and public officials must make in planning for Chicago's future place in aviation."

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Madison-Kipp Corp., 212 Waubesa St., Madison 4, Wis.

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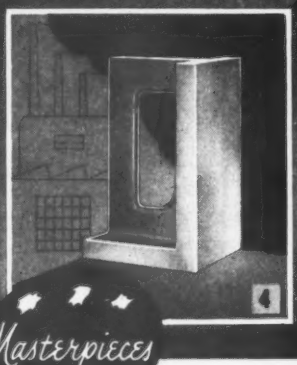

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to Industry and Research, will be indexed in the technical "Digest-Index" issued by the National Research Bureau, Inc., 415 North Dearborn Street, Chicago 10, Illinois. They will be supplied on microfilm through the Library of Industrial Research, a non-profit organization, acting as clearing house for the exchange of Technical, Scientific and Management information. Many of the leading firms in the United States and Canada are members of the Library.

Lincoln Foundation Rules for Textbook Award Program

A twelve-page brochure, covering the object and purpose of the Award Program for Textbooks in Modern Design and setting forth all rules and conditions governing the program, has just been published by trustees of the James F. Lincoln Arc Welding Foundation, Cleveland, Ohio.

The brochure is the official document of the new Award Program as announced by the Foundation in April to encourage preparation of textbooks on design for use by engineering undergraduates in machine design and in structural design for fabrication by all processes including welding. It thoroughly covers the types of subject matter to be treated in these two important fields, listing the awards which are divided into the two classes and which total $20,000.

The attractively printed booklet carries such explanatory paragraphs as those dealing with royalties for manuscripts of award-winning authors, method of payment of awards, eligibility requirements, bases of judgment in rating papers, how to present subject matter, and other pertinent facts designed to assist prospective participants.

The brochure, entitled, "$20,000 Award Program for Textbooks Covering Machine and Structural Design for Modern Processes Including Welding," may

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Smith Tool & Engineering Co., 858 No. Sandusky Ave., Bucyrus, O.
Challenge Machinery Co., The, Grand Haven, Mich.

PLATES—Bench
Challenge Machinery Co., The, Grand Haven, Mich.
Delta Mfg. Co., The, 612A E. Vienna Ave., Milwaukee 1, Wis.

PLATES—Cold (See COLD PLATES)

PLATES—Lapping
Acme Tool Co., 196 Church St., New York 13, N. Y.
Challenge Machinery Co., The, Grand Haven, Mich.
Delta Mfg. Co., The, 612-C E. Vienna Ave., Milwaukee 1, Wis.
Smith Tool & Engineering Co., 858 No. Sandusky Ave., Bucyrus, O.

PLATES—Surface, Glass (See SURFACE PLATES, Glass)

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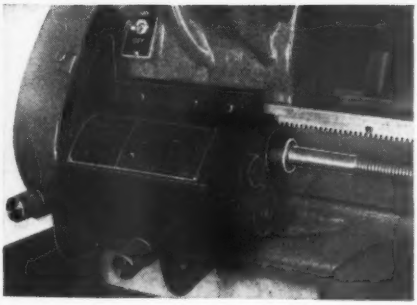

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Accidents and Light

J. L. Kilpatrick, Illuminating Engineering Department, Westinghouse Electric and Manufacturing Company, Bloomfield, New Jersey, has made the following observations regarding accidents and light.

With about 87 percent of our impressions being visual, there can be little doubt that the eyes hold the potential crux of accident prevention. In order to avoid any accident it is essential that the hazard be seen in sufficient time for proper action.

Seeing is the only one of our five senses which is dependent on some other factor. While our eyes may be perfect, and there may be plenty of objects around to be seen, if there is no light our sense of sight is useless.

Good lighting is an absolute necessity for accident prevention. Good lighting must be engineered to prevent eye-fatigue, to eliminate glare, both direct and reflected, to minimize shadows and to provide see-ability for the prevention of accidents. There are a number of light sources and innumerable lighting fixtures which, properly engineered, can provide good lighting for any specific plant. It is essential that competent illuminating engineers should be consulted when changes in lighting are contemplated.

Providing good lighting on the basis of the initial installation is not enough. The lighting system must be maintained and a depreciation factor must be provided in the design of the lighting system. Otherwise, an installation which was quite satisfactory when installed may, in a comparatively few months, produce a lighting result which is only one-half, or even one-third, as much as the original. Poor lighting maintenance in itself produces an accident hazard.

PRECISION PARTS—Hardened & Ground
Acme Industrial Co., 206 No. Laflin St., Chicago 7, Ill.

PRESSES—Air
Mead Specialties Co., Dept. HA-545, 4114 No. Knox Ave., Chicago 41, Ill.

PRESSES—Arbor
Lempco Products, Inc., 5713 Dunham Rd., Bedford, O.
Wilson, K. R., 215-217 Main St., Buffalo 3, N. Y.

PRESSES—Broaching
American Broach & Machine Co., Ann Arbor, Mich.

PRESSES—Drill
Baker Bros., Inc., Toledo 10, O.
Delta Mfg. Co., The, 612-C E. Vienna Ave., Milwaukee 1, Wis.
Hamilton Tool Co., The, Ninth & Hanover Sts., Hamilton, O.

PRESSES—Flanging
Cincinnati Shaper Co., The, Hopple, Garrard & Elam Sts., Cincinnati, O.

PRESSES—Hydraulic
Lempco Products, Inc., 5713 Dunham Rd., Bedford, O.

PRESSES—Straightening
American Broach & Machine Co., Ann Arbor, Mich.

PRESSES—Utility or Shearing
Producto Machine Co., The, 990 Housatonic Ave., Bridgeport 1, Conn.

PRODUCTION JOB WORK
Rockford Die & Tool Works, Inc., 1816 17th Ave., Rockford, Ill.

PRODUCTION MACHINE REPAIR PARTS
Enterprise Machine Parts Corp., The, 2735 Jerome Ave., Detroit, Mich.

PROFILERS
Acme Tool Co., 196 Church St., New York 13, N. Y.

PROJECTORS
Scherr Co., Inc., George, 200-B Lafayette St., New York 12, N. Y.

PUMPS—Centrifugal
Ruthman Machinery Co., The, 1808 Reading Rd., Cincinnati, O.

PUMPS—Circulating
Ruthman Machinery Co., The, 1808 Reading Rd., Cincinnati, O.

PUMPS—Coolant
Ruthman Machinery Co., The, 1808 Reading Rd., Cincinnati, O.

PUMPS—Lubricant
Ruthman Machinery Co., The, 1808 Reading Rd., Cincinnati, O.

PUNCHES—Center & Drive Pin
Lufkin Rule Co., Saginaw, Mich.

PUNCHES—Hand, Toggle Action
Knu-Vise, Inc., 1330 Plum St., Detroit 16, Mich.

PUNCHES—Standard & Interchangeable
Hovis Screwlock Co., 8100 E. 9 Mile Rd., Van Dyke, Mich.
Wales-Strippit Corp., 355 Payne Ave., No. Tonawanda, N. Y.
Whistler & Sons, Inc., S. B. 752-756 Military Rd., Buffalo, N. Y.

REAMER DRIVES
Lee Co., K. O., Aberdeen, S. D.

REAMERS
Black Drill Co., 1400 E. 222 St., Cleveland 17, O. (Div. Black Industries)
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.
National Twist Drill & Tool Co., 6522 Brush Ave., Detroit, Mich.
Putnam Tool Co., 2985 Charlevoix Ave., Detroit 7, Mich.
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.
Wesson Products Co., 709 Fisher Bldg., Detroit 2, Mich.

REAMERS—Special
Detroit Reamer & Tool Co., 2830 E. 7 Mile Rd., Detroit 12, Mich.

RETAINERS—Punch & Die
Hovis Screwlock Co., 8100 E. 9 Mile Rd., Van Dyke, Mich.

RIVETING MACHINES
Linley Brothers Co., 662 State St. Extension, Bridgeport 1, Conn.
Tomkins-Johnson Co., The, 630 No. Mechanic St., Jackson, Mich.

ROLLER FEEDS—Automatic
Wittek Mfg. Co., 4305-15 W. 24th Place, Chicago 23, Ill..

RUBBER ABRASIVES—Soft
Roberts Rubber Co., Weldon, (Brightboy Industrial Div.) Newark 7, N. J.

RULES—Steel
Lufkin Rule Co., Saginaw, Mich.

SANDERS
Walls Sales Corp., 97 Warren St., New York, N. Y.

SAWING MACHINERY
Tannewitz Works, The, Grand Rapids 4, Mich.

SAWING MACHINES—Continuous
Continental Machines, Inc., 1303 So. Washington Ave., Minneapolis 4, Minn.

SAWING MACHINES—Metal
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago 39, Ill.
Peerless Machine Co., Dept. TDJ-545, Racine, Wis.

SAWS—Band
Tannewitz Works, The, Grand Rapids 4, Mich.

SAWS—Diamond (See DIAMOND SAWS)

SAWS—Foundry
Tannewitz Works, The, Grand Rapids 4, Mich.
Wells Mfg. Corp., 1940 Ash St., Three Rivers, Mich.

SAWS—General Purpose
Wells Mfg. Corp., 1940 Ash St., Three Rivers, Mich.

SAWS—Heavy Duty
Wells Mfg. Corp., 1940 Ash St., Three Rivers, Mich.

SAWS—Hole
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago 39, Ill.

SAWS—Hydraulic
Peerless Machine Co., Dept. TDJ-545, Racine, Wis.

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Simplifying and Reducing Government Questionnaires

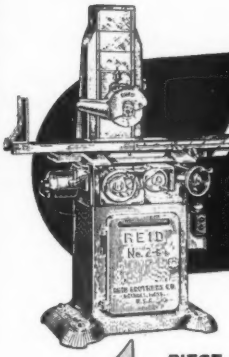
Practical accomplishments in simplifying and reducing the number of government questionnaires are set forth in a report by the Advisory Committee on Government Questionnaires to sponsoring organizations.

The efforts of the committee, in cooperation with government agencies, the report points out, have yielded definite benefits, saving many man hours and considerable sums of money on the part of business firms required to report. Harold D. Smith, Director of the Bureau of the Budget, which agency passes on questionnaires, writes the committee that it has been extremely helpful, particularly in supplying information about methods of reporting facts from routine company records, thus obviating special setups for this purpose.

The following typical examples of the committee's work are given in the report: merging of early procurement procedures and the development, refinement and adoption of standard and workable report forms to collect accurate and essential procurement information; reduction of burden involved in the basic monthly and annual financial reports of the Office of Price Administration accompanied by an examination of the need and use of such basic financial data by the OPA; development of standard reporting procedures to enable fair, accurate and fast termination and settlement of war contracts; exploration of business needs for postwar basic industrial statistics; joint development of reporting methods for the establishment of reconversion prices in the field of consumers' durable goods; examination of the government's proposed reconversion statistics program involving the resumption of the census of manufacturers, the conduct of a special census of business, and consumers' income.

The chairman of the committee is F. Stuart Fitzpatrick, of the Chamber of Commerce of the United States. The secretary is Russell Schneider. Offices are in the United States Chamber Building, Washington, D. C.

SAWS—Tool & Die Shop
Wells Mfg. Corp., 1940 Ash St., Three Rivers, Mich.
SCALES—Steel
Lufkin Rule Co., Saginaw, Mich.
SCREW MACHINE PRODUCTS—Contract
Star Machine & Tool Co., 9320 Woodland Ave., Cleveland, O.
SCREW MACHINES—Hand
Logan Engineering Co., Chicago 30, Ill.
SCREWS—Hexagon Head Cap
Strong, Carlisle & Hammond Co., 1394 W. 3rd St., Cleveland 13, O.
SCREWS—Hollow Set & Shoulder
Die Supply Co., 4751 Hough Ave., Cleveland, O.
Strong, Carlisle & Hammond Co., 1394 W. 3rd St., Cleveland 13, O.
SCREWS—Socket Head
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.
Detroit Die Set Corp., 2895 W. Grand Blvd., Detroit 2, Mich.
Die Supply Co., 4751 Hough Ave., Cleveland, O.
Standard Pressed Steel Co., Box 600, Jenkintown, Pa.
Strong, Carlisle & Hammond Co., 1392 W. 3rd St., Cleveland 13, O.
SCREWS—Socket Head Cap
Holo-Krome Screw Corp., The, Hartford 10, Conn.
SCREWS—Square Head Set
Strong, Carlisle & Hammond Co., 1392 W. 3rd St., Cleveland 13, O.
SCREWS—Transfer
Die Supply Co., 4751 Hough Ave., Cleveland, O.
SCRIBERS
Ford Motor Co., Johansson Div., Dearborn, Mich.
Lufkin Rule Co., Saginaw, Mich.
SHAPER TOOLS
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.
SHAPERS
Ames Co., B. C., Waltham, Mass.
Automotive Maintenance Machinery Co., (Ammco) 2100 Commonwealth Ave., North Chicago, Ill.
SHARPENING STONES
Carborundum Co., Niagara Falls, N. Y.
Norton Co., Worcester 6, Mass.
SHEARS
Cincinnati Shaper Co., The, Hopple, Garrard & Elam Sts., Cincinnati, O.
SHEARS—Bench
National Machine Tool Co., 1536 Clark St., Racine, Wis.
O'Neil-Irwin Mfg. Co., 315 8th Ave., Minneapolis 15, Minn.
SHIM—Stick
Industrial Products Suppliers, 106 Water St., New York 5, N. Y.
SINE BARS
Ford Motor Co., Johansson Div., Dearborn, Mich.
SLOTTERS
Ames Co., B. C., Waltham, Mass.
Douglas Machinery Co., Inc., 150 Broadway, New York 7, N. Y.
SLOTTERS—Universal
Douglas Machinery Co., Inc., 150 Broadway, New York 7, N. Y.
SPACERS—Arbor
Detroit Stamping Co., 344 Midland Ave., Detroit 3, Mich.
Industrial Products Suppliers, 1066 Water St., New York 5, N. Y.
SPANNERS
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.
Sommer & Adams Co., The, 18511 Euclid Ave., Cleveland, O.
SPECIAL MACHINERY
Builders Iron Foundry, 23 Codding St., Providence 1, R. I.
Bunell Machine & Tool Co., 1601 E. 23rd St., Cleveland 19, O.
Enterprise Machine Parts Corp., The, 2735 Jerome Ave., Detroit, Mich.
Industrial Machine Co., 1436 E. 47th St., Cleveland, O.
McKinney Tool & Mfg. Co., The, 1673 Arabella Rd., Cleveland 12, O.
Merz Engineering Co., Indianapolis 7, Ind.
Peerless Machine Co., Dept. TDJ-545, Racine, Wis.
SPECIAL TOOLS
Rockford Die & Tool Works, Inc., 1816-17th Ave., Rockford, Ill.
SPEED CONTROL VALVES
Tomkins-Johnson Co., The, 630 No. Mechanic St., Jackson, Mich.
SPINDLES
Sav-Way Industries, P. O. Box 117, Harper Sta., Detroit 13, Mich.
SPOTTACERS
Bokum Tool Co., 14775 Wildermere Ave., Detroit 21, Mich.
Continental Tool Works, Div. of Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 6, Mich.
Wesson Products Co., 709 Fisher Bldg., Detroit 2, Mich.
SPOTTING PASTE
Dykem Co., The, 2201 No. 11th St., St. Louis, Mo.
SPRINGS
Gibson Co., The, William D., 1800 Clybourn Ave., Chicago 14, Ill. (Div. of Associated Spring Corp.)
Muehlhausen Spring Corp., 875 Michigan Ave., Logansport, Ind.
SPRINGS—Die
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.
Detroit Die Set Corp., 2895 W. Grand Blvd., Detroit 2, Mich.
Die Supply Co., 4751 Hough Ave., Cleveland, O.
Muehlhausen Spring Corp., 875 Michigan Ave., Logansport, Ind.
SQUARES—Combination, Try & Mitre
Lufkin Rule Co., Saginaw, Mich.
STACKERS
Economy Engineering Co., 2659 W. Van Buren St., Chicago 12, Ill.
STAMPINGS
Acro Tool & Die Works, 4556 Broadway, Chicago 12, Ill.
Alofs Mfg. Co., 1619 Madison Ave., S.E., Grand Rapids, Mich.
Detroit Stamping Co., 344 Midland Ave., Detroit 3, Mich.
Federal Tool Corp., 400 No. Leavitt St., Chicago 12, Ill.
General Die & Tool Co., 2067 W. 55th St., Cleveland, O.



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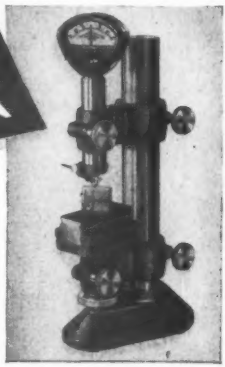

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Machine Tool Manufacturers Form Export Association

Four leading manufacturers of machine tools have formed the AMTEA Corporation (American Machine Tool Export Associates) to be made up entirely within the machine tool industry to serve export business. AMTEA includes as initial stockholders the Landis Tool Company, Waynesboro, Pa., manufacturers of precision grinding machinery; Lodge and Shipley Machine Tool Company, Cincinnati, Ohio, manufacturers of engine lathes; Kearney & Trecker Corporation, Milwaukee, Wis., manufacturers of milling machines, and the Warner & Swasey Company, Cleveland, Ohio, manufacturers of turret lathes. AMTEA'S future plans, as formulated in a meeting held in New York April 18 and 19, include the addition of more member machine tool manufacturers of other types of equipment such as drilling machines, boring machines, shapers, planers, additional types of grinders, gear cutters, punch presses, etc. In its completed structure AMTEA Corporation will be in a position to offer all types of machine tools in common use. All future member companies will become stockholders in the corporation.

Sponsored by some of the most prominent manufacturers of the machine tool industry, AMTEA Corporation has been organized to consolidate the efforts of these and subsequently, other manufacturers in a coordinated program of sales, engineering and service to the expanding industrial market in Latin America. AMTEA will operate with its own capital, buying directly from the member manufacturers and selling throughout Latin America.

AMTEA'S board of directors have been elected officers of the organization. Mr. Joseph L. Trecker, Executive Vice President of Kearney & Trecker, was elected President of AMTEA; Mr. Walter K. Bailey, Vice President of Warner & Swasey Co., was elected Vice President; Mr. M. A. Hollengreen, Vice President of Landis Tool Co., was elected Vice President; and Mr. William L. Dolle,

Gibson Co., The, William D., 1800 Clybourn Ave., Chicago 14, Ill., (Div. of Associated Spring Corp.)
Star Machine & Tool Co., 9320 Woodland Ave., Cleveland, O.

STAMPINGS—Precision
Gibson Co., The, William D., 1800 Clybourn Ave., Chicago 14, Ill., (Div. of Associated Spring Corp.)

STAMPS—Steel
Cunningham Co., M. E., 104 Carson St., Pittsburgh 19, Pa.
Gottscho, Inc., Adolph, 190-C Duane St., New York 13, N. Y.
Mercury Metal Die & Letter Co., 546 E. 16th St., Los Angeles 15, Calif.
New Method Steel Stamps, Inc., 147 Jos. Campau St., Detroit 7, Mich.
Sossner Tap & Tool Co., 161 Grand St., New York 13, N. Y.

STEEL—Aircraft
Wheelock, Lovejoy & Co., Inc., 138 Sidney St., Cambridge 39, Mass.

STEEL—Alloy
Allegheny Ludlum Steel Corp., Dept. TD-34, Detroit 20, Mich.
Bissett Steel Co., The, 945 E. 67th St., Cleveland 8, O.
Columbia Tool Steel Co., 410 E. 14th St., Chicago Hts., Ill.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland 13, O.
Wheelock, Lovejoy & Co., Inc., 138 Sidney St., Cambridge 39, Mass.

STEEL—Alloy, High Nickel
Carpenter Steel Co., The, Dept. No. 9-L, Reading, Pa.

STEEL—Carbon
Bissett Steel Co., The, 945 E. 67th St., Cleveland 8, O.
Columbia Tool Steel Co., 410 E. 14th St., Chicago Hts., Ill.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland 13, O.
Firth-Sterling Steel Co., McKeesport, Pa.

STEEL—Chromium
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland 13, O.

STEEL—"Cobalt"
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland 13, O.

STEEL—Cold Drawn
Bissett Steel Co., The, 945 E. 67th St., Cleveland 8, O.

STEEL—Die (See STEEL—Tool & Die)

STEEL—Die Casting
Latrobe Electric Steel Co., Latrobe, Pa.

STEEL—Drill
Crucible Steel Co. of America, Dept. TD, 405 Lexington Ave., New York 17, N. Y.

STEEL—Electrical
Allegheny Ludlum Steel Corp., Dept. TD-34, Detroit 20, Mich.

STEEL—Graphitic
Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.

STEEL—Heat Resisting
Allegheny Ludlum Steel Corp., Dept. TD-34, Detroit 20, Mich.

STEEL—High Speed
Allegheny Ludlum Steel Corp., Dept. TD-34, Detroit 20, Mich.
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.
Bokum Tool Co., 14775 Wildermere Ave., Detroit 21, Mich.
Cleveland Twist Drill Co., 1260 E. 49th St., Dept. B, Cleveland 14, O.
Columbia Tool Steel Co., 410 E. 14th St., Chicago Hts., Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York 17, N. Y.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland 13, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.

STEEL—Hobbing
Carpenter Steel Co., The, Dept. No. 9-L, Reading, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.

STEEL—Mold
Carpenter Steel Co., The, Dept. No. 9-L, Reading, Pa.

STEEL—N.E. Analysis
Bissett Steel Co., The, 945 E. 67th St., Cleveland 8, O.

STEEL—Punch, Chisel & Shock Resisting
Latrobe Electric Steel Co., Latrobe, Pa.

STEEL—Special Purpose
Crucible Steel Co. of America, Dept. TD, 405 Lexington Ave., New York 17, N. Y.

STEEL—Stainless
Allegheny Ludlum Steel Corp., Dept. TD-34, Detroit 20, Mich.
Carpenter Steel Co., The, Dept. No. 9-L, Reading, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York 17, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.

STEEL—Strip, Hot & Cold Rolled
Allegheny Ludlum Steel Corp., Dept. TD-34, Detroit 20, Mich.

STEEL—Tool & Die
Allegheny Ludlum Steel Corp., Dept. TD-34, Detroit 20, Mich.
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.
Carpenter Steel Co., The, Dept. No. 9-L, Reading, Pa.
Cleveland Twist Drill Co., The, 1260 E. 49th St., Cleveland, O.
Crucible Steel Co. of America, 405 Lexington Ave., New York 17, N. Y.
Columbia Tool Steel Co., 410 E. 14th St., Chicago Hts., Ill.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland 13, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Wheelock, Lovejoy & Co., Inc., 138 Sidney St., Cambridge 39, Mass.

STEEL PLATE—Fabricator
Detroit Die Set Corp., 2895 W. Grand Blvd., Detroit 4, Mich.

STEEL PLATE—Ground
Die Supply Co., 4751 Hough Ave., Cleveland, O.

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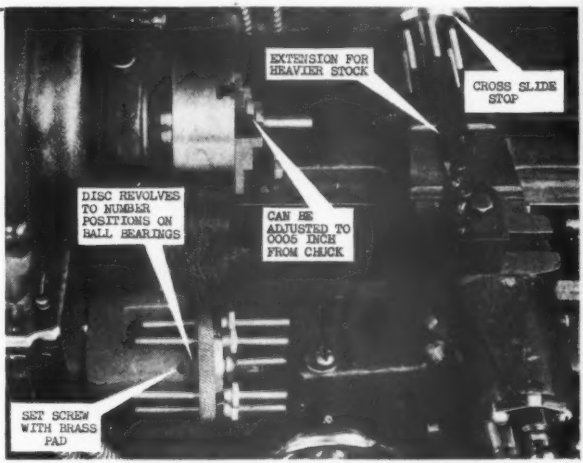
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President of Lodge & Shipley Machine Tool Company, was elected Secretary-Treasurer. Mr. Fred M. Read, Foreign Sales Manager of Kearney & Trecker Corporation, has been named General Manager.

AMTEA Corporation began operations May 1, with offices at the Empire State Building, 350 Fifth Avenue, New York.

Business Statistics Survey

A newly created committee of the Chamber of Commerce of the United States will make a broad survey of the entire field of business statistics.

The committee, which will be headed by Herman Steinkraus, president of the Bridgeport Brass Company, Bridgeport, Conn., will attempt to determine to what extent government should participate in business reporting and how much reporting and disseminating of facts business should conduct on its own account.

The entry of the United States into the war brought a need for the collection of many statistics about business operations which had not before been gathered. The new Chamber committee will study the situation, with a view to recommending what statistical data required by war can be dispensed with when peace is restored and what new kinds of statistics would be helpful in a peacetime economy.

It is realized that certain statistical data would be extremely helpful in the reconversion period, and the committee therefore will undertake to develop suggestions that will be useful when transition from war to peace gets under way.

Among proposals for facilitating the reconversion of business to peacetime operation are some which are predicated on extensive use of statistics by government agencies for forecasting labor requirements, national income and capital investment. The new committee will undoubtedly wish to examine the effects and implications of such proposals. It

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STEEL PLATE—Rough or Machined
Torch Cut Shapes
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.
Detroit Die Set Corp., 2895 W. Grand Blvd., Detroit 12, Mich.
Die Supply Co., 4751 Hough Ave., Cleveland, O.

STENCILS—Metal
Gottscho, Inc., Adolph, 190-C Duane St., New York 13, N. Y.

SURFACE PLATES (See PLATES, Surface)

SURFACER—Disc & Belt
Production Machine Co., Dept. TJ, Greenfield, Mass.

SURFACING MACHINES—Belt Type
Production Machine Co., Dept. TJ, Greenfield, Mass.

SUTTONIZING
Welding Equipment & Supply Co., 223 Leib St., Detroit 7, Mich.

TABLES—Circular
Gorton Machine Co., George, 1205 Racine St., Racine, Wis.

TABLES—Elevating, Portable
Lyon-Raymond Corp., 410 Madison St., Greene, N. Y.
Hamilton Tool Co., The, Ninth & Hanover Sts., Hamilton, O.

TABLES—Index
Gorton Machine Co., George, 1205 Racine St., Racine, Wis.

TABLES—Rotary
Acme Tool Co., 196 Church St., New York 13, N. Y.
Gorton Machine Co., George, 1205 Racine St., Racine, Wis.

TABLES—Turn
Challenge Machinery Co., The, Grand Haven, Mich.

TAP GRINDERS
Boggis & Co., Henry P., 1277 W. 3rd St., Cleveland, O.

TAP RECONDITIONING MACHINE
Detroit Tap & Tool Co., 8432 Butler St., Detroit 11, Mich.

TAPES—Measuring
Lufkin Rule Co., Saginaw, Mich.

TAPPER—Hand
Die Supply Co., 4751 Hough Ave., Cleveland, O.

TAPPER—Precision
Brand Tool & Supply Co., Flower at Washington, Los Angeles 15, Calif.

TAPPING HEADS
Procunier Safety Chuck Co., 12-14 So. Clinton St., Chicago, Ill.

TAPPING MACHINES
Detroit Tap & Tool Co., 8432 Butler Ave., Detroit 11, Mich.
Procunier Safety Chuck Co., 12-14 So. Clinton St., Chicago, Ill.

TAPS
Besly & Co., Charles H., 118-124 No. Clinton St., Chicago 6, Ill.
Detroit Tap & Tool Co., 8432 Butler Ave., Detroit 11, Mich.
Hy-Pro Tool Co., 489 Mt. Pleasant St., New Bedford, Mass.
Sossner Tap & Tool Co., 161 Grand St., New York 13, N. Y.

TELESCOPERS
Economy Engineering Co., 2659 W. Van Buren Ave., Chicago 12, Ill.

THREADING TOOLS
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

TOOL BITS
Acme Tool Co., 196 Church St., New York 13, N. Y.
Allegheny Ludlum Steel Corp., Dept. TD-34, Detroit 20, Mich.
Black Drill Co., Div. Black Industries, 1400 E. 222nd St., Cleveland 17, O.
Boyar-Schultz Corp., 2112 Walnut St., Chicago 12, Ill.
Carboloy Co., Inc., 11109 E. 8 Mile Rd., Detroit 32, Mich.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland 13, O.
Die Supply Co., 4751 Hough Ave., Cleveland, O.
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.
Wesson Products Co., 709 Fisher Bldg., Detroit 2, Mich.

TOOL SHANKS
Cooper-Bessemer Corp., The, Dept. J, Mt. Vernon, O.

TOOL STANDS
Scherr Co., Inc., George, 200-B Lafayette St., New York 12, N. Y.

TOOL STEEL (See STEEL—Tool & Die)

TOOLS
Acro Tool & Die Works, 4556 Broadway, Chicago 40, Ill.
Alofs Mfg. Co., 1619 Madison Ave., S.E., Grand Rapids, Mich.
Barth Stamping & Machine Works, Denison & W. 34th St., Cleveland, O.
Bunell Machine & Tool Co., The, 1601 E. 23rd St., Cleveland 14, O.
Enterprise Machine Parts Corp., The, 2735 Jerome Ave., Detroit, Mich.
McKinney Tool & Mfg. Co., The, 1673 Arabella Rd., Cleveland 12, O.
National Machine Tool Co., 1536 Clark St., Racine, Wis.
Kiffer Tool & Die Co., 5601 Tillman Ave., Cleveland, O.

TOOLS—Carbide Tipped
Continental Tool Works, Div. of Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 6, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kennametal, Inc., 500 Lloyd Ave., Latrobe, Pa.
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.

TOOLS—Cutting (See CUTTING TOOLS)

TOOLS—Diamond (See DIAMOND TOOLS)

TOOLS—Flexible Shaft
Foredom Electric Co., 27 Park Pl., New York 7, N. Y.

TOOLS—Machine
South Bend Lathe Works, 432 E. Madison St., South Bend 22, Ind.

TOOLS—Portable Electric
Acme Tool Co., 196 Church St., New York 13, N. Y.

TOOLS—Recessing
Acme Tool Co., 196 Church St., New York 13, N. Y.

TOOLS—Sintered Carbide
Firth-Sterling Steel Co., McKeesport, Pa.

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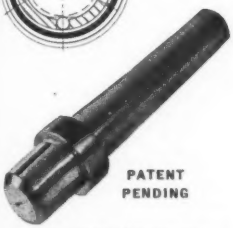

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will want to determine whether safeguards should be provided against new demands for statistics from those who advocate greater regulation of business and who seek extensive data for purposes of accomplishing their objectives.

Invitations to membership on the Chamber's new committee have been extended to group of representative business executives, economists, association executives and others qualified by training and experience to furnish sound counsel. Organization and development of material for the committee will be conducted by the Chamber's Economic Research Department, with Arthur B. Gunnarson in charge as secretary.

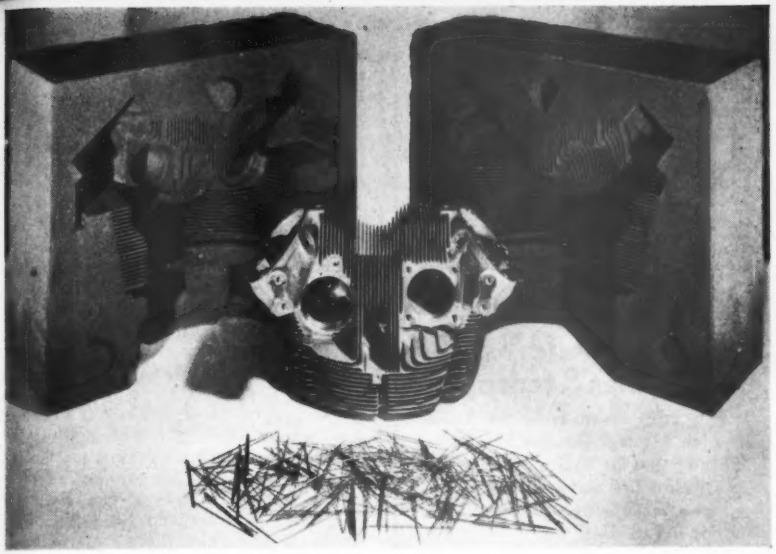
Improved Labor Utilization Procedures

The Department of Labor, Washington, D. C., has published a 44-page bulletin (No. 807) entitled "Improvement of Labor-Utilization Procedures". Written from the standpoint of plant management, this bulletin will be of value to employers who are in search of improved labor-utilization procedures.

During the earlier stages of the war, emphasis was placed primarily on the production of needed materials and weapons irrespective of any considerations of cost. Most recently, the need for economy in the use of labor resources has gained increased importance. Since the virtual completion of industrial mobilization, it is to be expected that improved efficiency in labor use will be a major factor in permitting increased production of needed munitions and essential civilian supplies.

Considerable material has already been written on labor-utilization. The purpose of this bulletin is to point out briefly the salient principles in this general field of inquiry, and to indicate methods which may assist in an analysis of the effectiveness of labor-utilization procedures within the individual plant. The text is based not only on published studies dealing with various aspects of labor utilization but also on the actual experiences of a large number of plants during the war period.

TOOLS—Special (See SPECIAL TOOLS)
TOOLS—Special Cutting (See CUTTING TOOLS—Special)
TOOLS—Steel Marking
Cunningham Co., M. E., 104 Carson St., Pittsburgh 19, Pa.
TOOLS—Turning (See TURNING TOOLS)
TOOLS—Wheel & Thread Dressing
Wheel Trueing Tool Co., 3200 W. Davison, Detroit 6, Mich.
TORCHES—Hand Gas
Johnson Gas Appliance Co., 575 E. Ave. N.W., Cedar Rapids, Ia.
TRUCKS—Hydraulic
Lyon-Raymond Corp., 410 Madison St., Greene, N. Y.
TUBING—Tool Steel
Bissett Steel Co., The, 945 E. 67th St., Cleveland 8, O.
TUBING—Welded Stainless
Carpenter Steel Co., The, Dept. 9-L, Reading, Pa.
TURNING TOOLS
Wheel Trueing Tool Co., 3200 W. Davison, Detroit 6, Mich.
TYPE—Rubber
Gottscho, Inc., Adolph, 190-C Duane St., New York 13, N. Y.
TYPE—Steel
Gottscho, Inc., Adolph, 190-C Duane St., New York 13, N. Y.
New Method Steel Stamps, Inc., 147 Jos. Campau, Detroit 7, Mich.
TYPE HOLDER
Mercury Metal Die & Letter Co., 546 E. 16th St., Los Angeles 15, Calif.
New Method Steel Stamps, Inc., 147 Jos. Campau, Detroit 7, Mich.
V-BLOCKS
Challenge Machinery Co., The, Grand Haven, Mich.
Lufkin Rule Co., Saginaw, Mich.
Scherr Co., Inc., George, 200-B Lafayette St., New York 12, N. Y.
VALVES—Air
Mead Specialties Co., 4114 No. Knox Ave., Chicago 41, Ill.
VISE JAW CAPS
Yost Mfg. Co., 1000 Main St., Meadville, Pa.
VISES
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.
Gorton Machine Co., George, 1205 Racine St., Racine, Wis.
Producto Machine Co., The, 990 Housatonic Ave., Bridgeport 1, Conn.
Wesson Products Co., 709 Fisher Bldg., Detroit 2, Mich.
Yost Mfg. Co., 1000 Main St., Meadville, Pa.
VISES—Air
Mead Specialties Co., Dept. HA-545, 4114 No. Knox Ave., Chicago 41, Ill.
VISES—Bench
Acme Tool Co., 196 Church St., New York 13, N. Y.
Yost Mfg. Co., 1000 Main St., Meadville, Pa.
VISES—Drill Press
National Machine Tool Co., 1536 Clark St., Racine, Wis.
Thomas Hoist Co., 20 So. Hoyne Ave., Chicago 12, Ill.
Yost Mfg. Co., 1000 Main St., Meadville, Pa.
VISES—Machine
Cincinnati Milling Machine Co., Cincinnati 9, O.
Gorton Machine Co., George, 1205 Racine St., Racine, Wis.
Producto Machine Co., The, 990 Housatonic Ave., Bridgeport 1, Conn.
VISES—Pipe
Yost Mfg. Co., 1000 Main St., Meadville, Pa.
VISES—Milling Machine
Acme Tool Co., 196 Church St., New York 13, N. Y.
Gorton Machine Co., George, 1205 Racine St., Racine, Wis.
Hartford Special Machinery Co., The, 281 Homestead Ave., Hartford, Conn.
VISES—Universal
Wesson Products Co., 709 Fisher Bldg., Detroit 2, Mich.
VISES—Woodworkers' & Patternmakers'
Yost Mfg. Co., 1000 Main St., Meadville, Pa.
WASHERS—Lock & Wrought
Die Supply Co., 4751 Hough Ave., Cleveland, O.
WELDERS—Arc
Lee Co., K. O., Aberdeen, S. D.
WELDING
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.
WELDING ELECTRODES
Welding Equipment & Supply Co., 223 Leib St., Detroit 7, Mich.
WELDING PLIERS
Knu-Vise, Inc., 1330 Plum St., Detroit 16, Mich.
WELDING POSITIONERS
Cullen-Friestedt Co., 1316 So. Kilbourn Ave., Chicago 23, Ill.
Lyon-Raymond Corp., 410 Madison St., Greene, N. Y.
WELDING RODS
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland 13, O.
WHEEL DRESSING TOOLS (See TOOLS—Wheel Dressing)
WHEELS—Abrasive
Besly & Co., Charles H., 118-124 No. Clinton St., Chicago 6, Ill.
WHEELS—Cutting Off
Carborundum Co., Niagara Falls, N. Y.
WHEELS—Diamond (See DIAMOND WHEELS)
WHEELS—Mounted
Boyar-Schultz Corp., 2112 Walnut St., Chicago 12, Ill.
Carborundum Co., Niagara Falls, N. Y.
Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago 7, Ill.
WIRE FORMS & SHAPES
Gibson Co., The, William D., Div. of Associated Spring Corp., 1800 Clybourn Ave., Chicago 14, Ill.
WRENCH SETS
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.
WRENCHES
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.



Improved Technique Increases Production

Production of sand molds used in casting aluminum cylinder heads has been increased 330 percent through improvements in the positions of risers and other details developed by Chrysler Corporation production executives and engineers at the Dodge Chicago Plant, which is in volume production on 2200 horsepower, 18 cylinder, Wright radial air-cooled engines used to power the Boeing B-29 and other large aircraft.

Standard foundry practice normally requires the use of 750 hand installed steel pins in each mold to prevent breaking down of the sand fins when hot metal is being poured into them. At the Dodge Chicago Plant only 150 pins are used, which allows a saving of more than 36 man-hours per machine every eight hours. Also, through the use of an improved gate and riser, from five to ten pounds of aluminum per casting are saved, which will not have to be remelted after the casting is poured.

When at capacity, 5,000,000 pounds of metal will be poured monthly in the aluminum foundry. The above photograph shows the sand molds behind a finished cylinder head, and in the foreground, the steel pins saved in the operation.

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STANDARD WHEREVER METAL IS MACHINED

Over 96% of the machine shops and tool rooms use ARMSTRONG TOOL HOLDERS, because each is a permanent, multi-purpose tool that does the work of a complete set of forged tools. Each is a stronger, more efficient tool that takes cutter bits quickly ground from stock shapes of high speed steel, thus "Saves: All Forging, 70% Grinding and 90% High Speed Steel."

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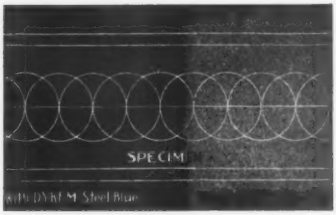

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Eighty-six representatives of industry in Northern Ohio met March 27th and laid plans for organizing the Cleveland-Youngstown chapter of the recently established American Society of Lubrication Engineers. Those attending the Cleveland meeting came from Youngstown, Akron, Canton, Warren, Toledo and Lorain in addition to Cleveland, and represented leading steel producers, oil refiners, transportation executives and professional research men as well as manufacturers in the automotive, machine tool, aircraft, electrical and lubricating equipment fields. Discussions during the evening emphasized the definite need for an organization giving representatives of the diversified industries of Northern Ohio the opportunity to exchange their experiences in solving problems in lubrication and allied fields. A charter petition has been

American Society of Lubrication Engineers

(TO PAGE 223—PLEASE)

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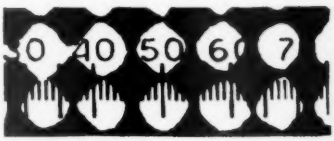

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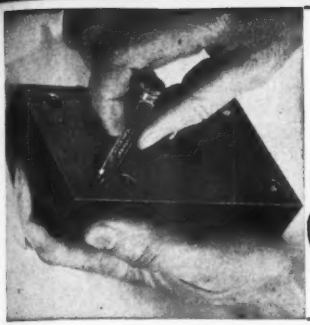

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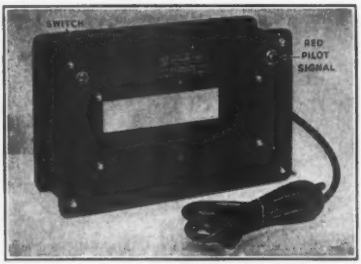

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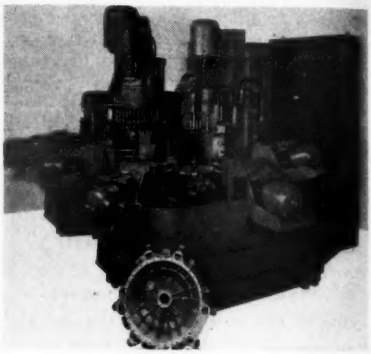

fixture slide, the starting button sends the slide to the operator's left and under a multiple spindle tapping head. At the same position are horizontal and angular unit tapping spindles, each having an individual lead screw. With completion of the left half machine cycle, the work automatically moves to the right and past the central loading station, for another operation cycle of vertical, horizontal and angular tapping spindles. A number of these tapping units, installed on hydraulically operated sub-slides, provide rapid advance of the entire unit prior to lead screw tapping. For example, the left hand station's vertical head has spindles on the periphery which have no hydraulic advance. However, the cluster of spindles in the center of the head automatically advance to tapping position several inches lower than the peripheral spindles. The machine is equipped with a master control push button station near the loading position and for setup convenience there is a push button station at each tapping unit. The machine has a welded steel base and a separate rear compartment containing tapping compound.

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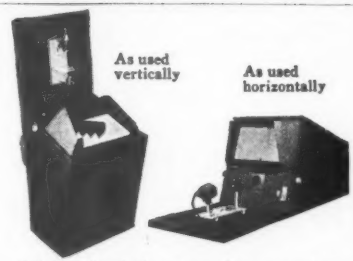

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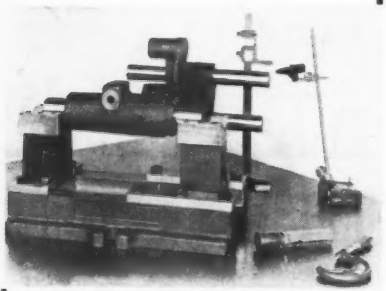

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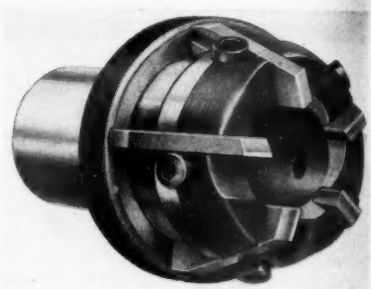
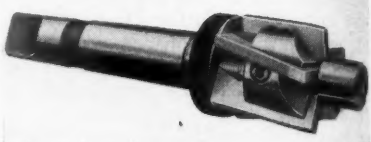
This Genesee Style B Adjustable Hollow Mill, in the upper illustration, made by the Genesee Mfg. Co., Inc., Dept. TD, of Rochester 4, N. Y., has blades set at a 12-degree rake angle for cutting steel, malleable-iron, aluminum and similar materials. These mills have ⅛" range adjustment to thousandths of an inch. As an aid to tool life preservation, the blades are adjustable and replaceable with a half turn of the lock screw. Though blade replacement is nominal in cost, the ¾" blade surface is made more durable by simple grinding. The blades are locked in a one-piece, chatterless body which can also be fitted with drills, reamers, pilots or form blades. In the lower illustration, the Style F Genesee Facing and Counterboring Tool is for light cuts where a smooth, accurate finish is required. Blade adjustment on or ahead of the center line is permitted by the 12-degree angle while the back sloping set permits regrinding of blades on the diameter and allows diameter variation. No decrease of chip space is caused by frequent grinding of these tools. All of them have interchangeable pilots.





INFORM-A-GRAM KEY No. B40-Y

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STURDY · DURABLE · HANDY

Capacity 7/16" hole through 1/4" steel or 3/8" hole through 5/16" steel.
All Parts Interchangeable - - - - - - - - - Weight 70 lbs.

Punches and dies carried in New York stock from 1/16" to 1/2" by 64ths. Also some drill numbered and commonly used square, flat and oval sizes.

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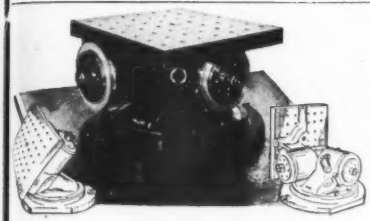

Universal Compound Angle Plate

Saves about 50% of time formerly consumed in set-up of work. Can be used on milling machine, shaper, jig borer, drill press, etc., to lay out, machine, and check work without removing work from plate. Can also be used as a 90° angle plate on the machine or on the surface plate. Holds work in any position from 0° to 90° in two planes, 90° apart, and in any position within 360° of the radial axis. The surface plate, from a position parallel to the base, may be tilted 90° in two directions and also rotated 360° on the base. Each of three protractors (two 5" and one 10" diameter) are calibrated to 1 minute and accurate within 10 seconds of the arc. Write for Bulletin No. 4. Angle Computer Co., 5720 Melrose Ave., Los Angeles 38, Calif.

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ANGLE COMPUTER

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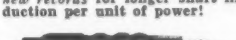

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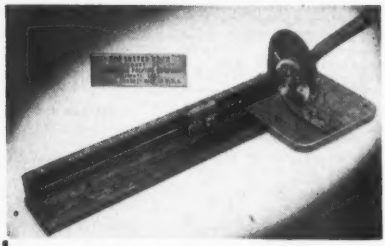

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A Cutting Tool for 1000 Uses

- Essential tool in any plant
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- Cuts any pliable material
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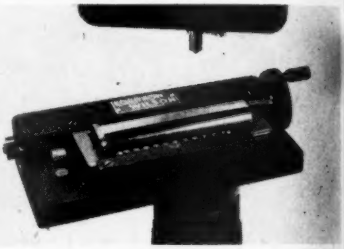
Equitron Fixture for Rockwell Hardness Testing

The Equitron fixture, made by the Wilson Mechanical Instrument Co., Inc., Dept. TJ, 371 Concord Ave., New York 54, N. Y., is recommended for properly supporting the test specimen for the end quench test for hardenability of steel (generally known as the Jominy end quench test). This fixture also provides for accurate positioning of the sample piece for each successive Rockwell hardness test at 1/16" intervals. The fixture is clamped securely to the elevating screw with a nut, and has ground surfaces for support of the underneath surface of the specimen. This support eliminates rocking or tipping of the specimen as it moves during the tests. Accurate spacing of the indentation is accomplished by a wheel and handle located at one end of the fixture. One wheel revolution provides a 1/16" movement of the test specimen. A ball click indexing mechanism indicates each 1/8" of spacing, thus while the fixture is in use little attention need be paid to the scale markings. The specimen is securely held in positive indexed position by spring pressure. The Equitron permits the making of tests up to 2 1/2" from the quenched end of the specimen, and a scale indicates the position at which each test is being made and facilitates tests at greater intervals than 1/8" if they are desired. The screw for moving the test specimen operates in oilless bearings. This Equitron fixture can be used on all Rockwell hardness testers of 8" vertical capacity (size 3), or taller.



INFORM-A-GRAM KEY No. 676-Y

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are precision ground—all parts subject to wear are hardened—ground to proper radius.

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Set of 3 (A,B,C) w/case 7.30
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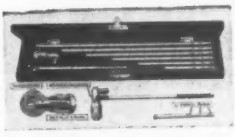

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Immediate Delivery

Also M & L Precision Tapper—Sine Plates and Bars—Universal Angle Plates

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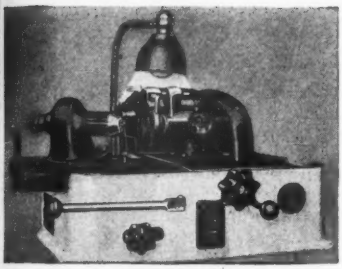

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The unique swivel head construction together with available attachments permits not only plain tool and cutter grinding, but also precision internal, external and surface grinding.

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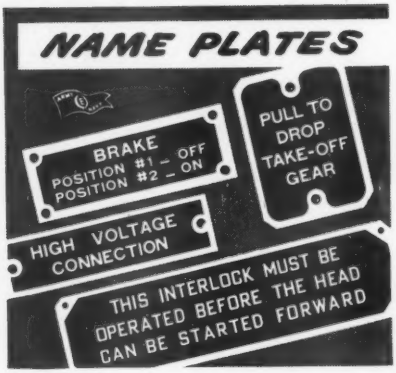
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PULL TO DROP TAKE-OFF GEAR
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THIS INTERLOCK MUST BE OPERATED BEFORE THE HEAD CAN BE STARTED FORWARD

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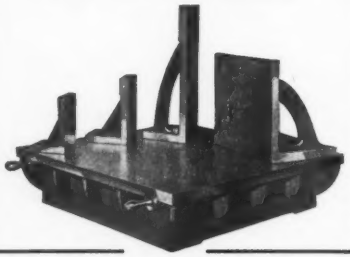

A full line of surface plates, angles and box parallels. Standard plate sizes from 8″x 8″ to 48″x 96″, larger sizes with or without legs. Plates are finish-planed and scraped to insure a very accurate surface.

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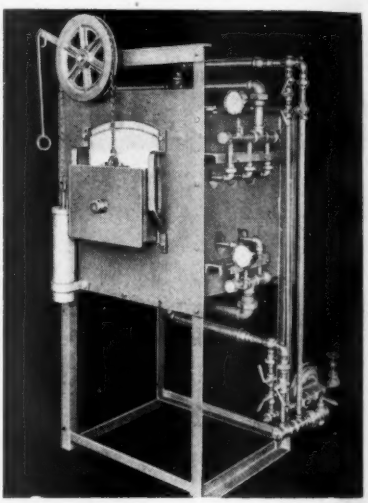
The No. 150-BB High Speed Oven Furnace, introduced by the American Gas Furnace Co., Dept. TD, Elizabeth B, N. J., is very versatile, both in achievement of its temperature range and the various methods of hardening that can be performed. The burners are manifolded in two sections. With both sets of burners operating, temperatures



up to 2500 degrees F for treating high speed steel, are readily achieved. With one set of burners, temperatures can be held as low as 1500 degrees F for treating ordinary carbon steels. The furnace's fuel needs are fulfilled with manufactured (city) gas, natural or bottled gas. The furnace can be operated either as a semi-muffle type, with hearth slab and supports; or as a full-muffle type, for use with diamond blocks. Conversion from one type to the other is accomplished by placing the muffle where it rests on the hearth slab in the furnace. If desired, the muffle is permanently sealable with auxiliary entrance bricks. When using diamond blocks, excepting the heaviest pieces, the need for pre-heating high speed steel is eliminated. For dimensional data, etc., bulletin No. 205 is available on request.

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SHOCK-ABSORBING COMTORPLUG

Extra protection for heavy shop duty

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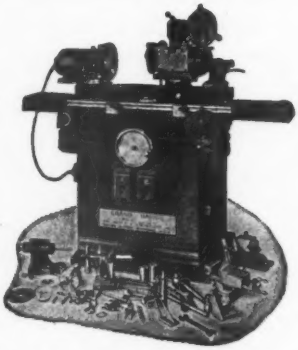

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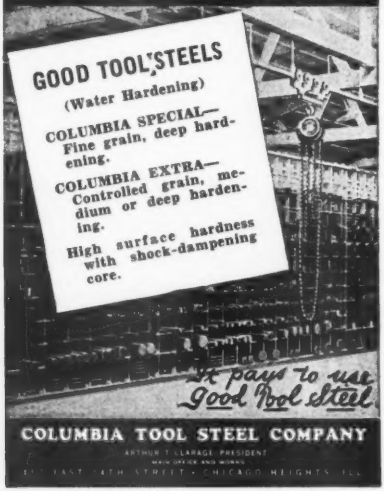
TOOL STEEL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COLUMBIA SPECIAL—
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High surface hardness with shock-dampening core.
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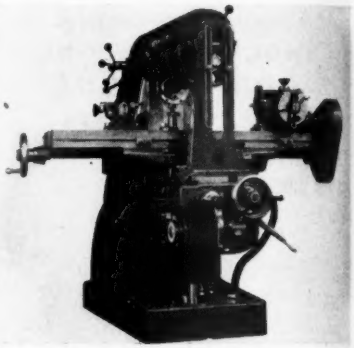

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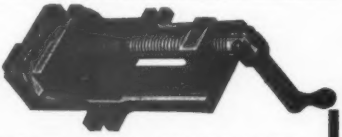

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Offered in two sizes

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
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2D	5	5½	23

Do you need a vise of ANY type?

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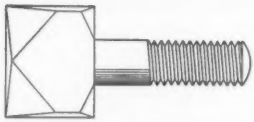

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FOR JIGS AND FIXTURES

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HARDNESS TESTING

has been done
with the
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since 1907

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THE SHORE INSTRUMENT & MFG. CO., INC.
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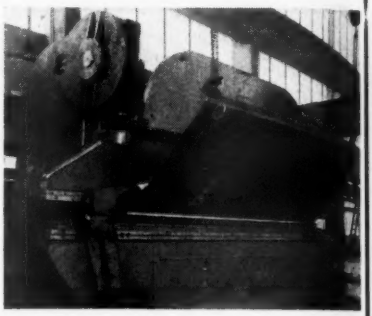
Cincinnati Press Brake

The Cincinnati Press Brake, made by The Cincinnati Shaper Co., Dept. TD, Cincinnati, Ohio, is designed for forming by single or progressive operations, corrugating and curving, notching, punching, trimming and embossing sheet metal and steel plate of various thicknesses, lengths and weights with a 1000-ton pressure capacity. The illustration shows a Press Brake having a dead weight of approximately 250,000 pounds cold bending twenty feet of ¾" steel plate. The



machine's design incorporates three noteworthy features: first, all frame members are carried directly on their supporting members with no loads on welded joints and with support bearings between the saddle and ram, and between the bed and housings that are cylindrical or spherical; second, all loads are transmitted directly up the center line of both housings with no distortion from eccentric loads; third, the open throat or gap permits work to be fed to or removed from the dies endwise. Tests show Cincinnati Press Brake beds and rams to be parallel within .005" under rated capacity with corresponding accuracy on the bends they form. A selection may be made from numerous types of all steel dies for forming, bending acute angles and flattening, for 90 degree and offset bending, four-way shaping, radius and U-bending, beading, wiring, channel forming, seaming and box shaping. The Cincinnati Shaper Company's engineering department is available to supply machine users with the best technical skill and accumulated experience to solve their die problems.

INFORM-A-GRAM KEY No. 630-Y

CONTRACT TOOLING AND PRODUCTION

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Designers and Manufacturers of Tools, Dies, Jigs, Fixtures, Metal Stampings

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filed with the society's national headquarters in Chicago on behalf of the Cleveland-Youngstown chapter. Other chapters already have been organized in Chicago and Pittsburgh. Officers elected were: Chairman, C. A. Bierlein, Cleveland Diesel Division of General Motors; Vice Chairman, R. J. Hagan, Republic Steel Corporation, Youngstown; Secretary-Treasurer, L. W. Fitch, The Dingle-Clark Company, Cleveland, Ohio.

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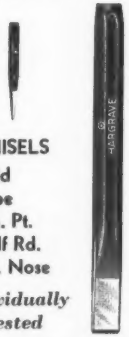

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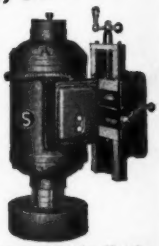

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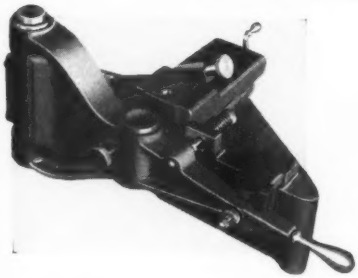

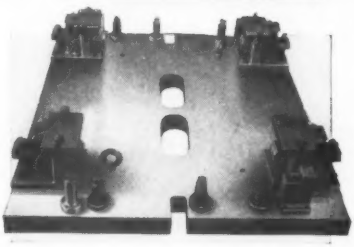

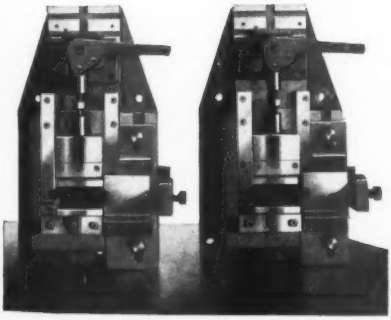

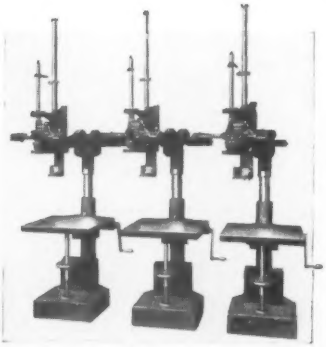

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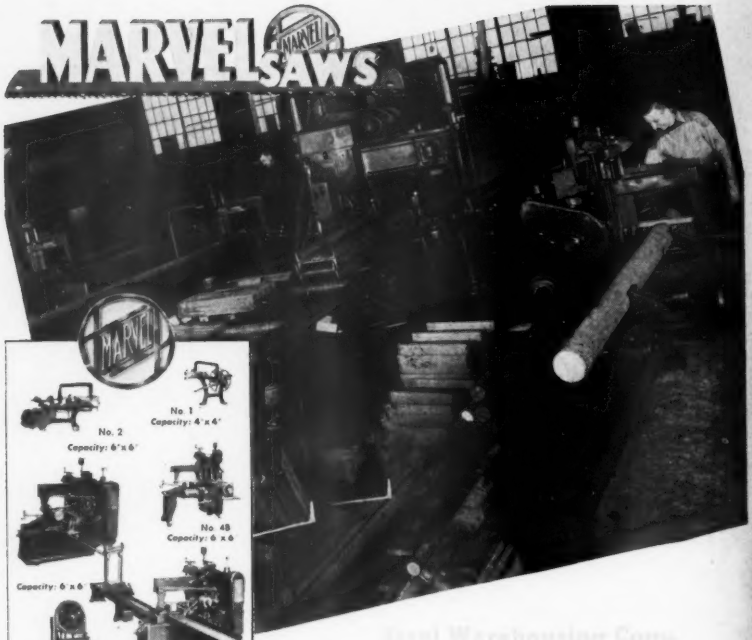

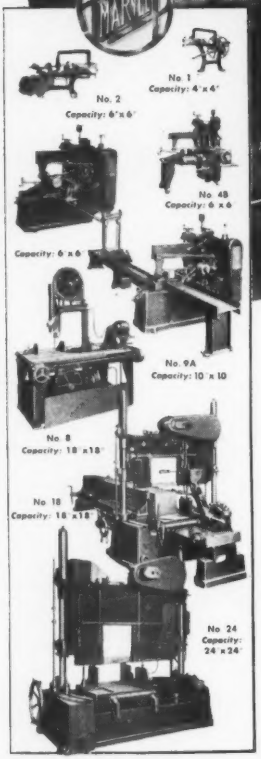

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